Independent guide to the BBC MICRO!

THE MICRO USER

Volume 3
Number 3
May 1985
£1.25

Can YOU face the death-defying challenge of...

STELLAR RESCUE

Bring your animation to life with sprites

Play dominoes on your micro
Build your own speaking clock
Create a computerised slide show
Save memory with overlays

Beat Amundsen to the South Pole

///
f0
f1
f2
f3
f4
f5
f7

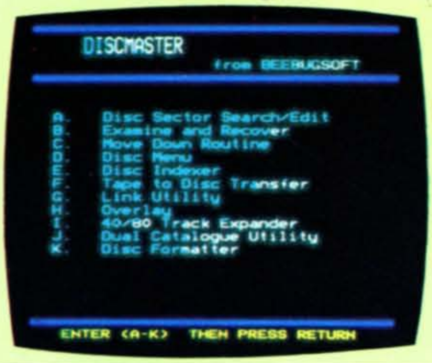
SERIOUS SOFTWARE

FOR THE B.B.C. MICRO

DISCMASTER

The New Disc Utility

- ★ **Eleven Powerful Utilities**
- ★ **Covers all aspects of disc usage**
- ★ **All called from a single menu**



```
DISCMASTER
                from BEEBUGSOFT

A.   Disc Sector Search/Edit
B.   Examine and Recover
C.   Move Down Routine
D.   Disc Menu
E.   Disc Indexer
F.   Tape to Disc Transfer
G.   Link Utility
H.   Overlay
I.   40/80 Track Expander
J.   Dual Catalogue Utility
K.   Disc Formatter

ENTER (A-K)  THEN PRESS RETURN
```

> A tremendous collection of utility programs... A godsend to disc users.
>
> EDUCATIONAL COMPUTING JANUARY 1985

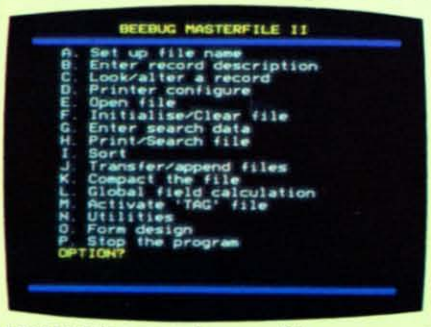
FEATURES INCLUDE:

1) **DISC EDITOR/ STRING SEARCH** A string search routine combined with a full screen editor, simply overtype on the screen (in hex or ascii) to update the disc.
2) **RECOVER** Recovers programs lost by accidental deletion or disc corruption.
3) **MOVEDOWN** The command *RUN will load, move down and run your long programs automatically, if you add this routine to them.
4) **DISC MENU** A colourful automatic menu to add to each of your discs, which will move down and RUN Basic programs, and *RUN machine code programs.
5) **INDEXER** Creates an information index file for all of your discs, which may then be displayed, up-dated or printed to help you keep track of your programs.
6) **COPIER** Transfer a whole cassette of programs onto disc automatically. (Will not copy protected cassettes).
7) **LINK** A utility to automatically call and insert useful routines from your own library, into your development programs.
8) **OVERLAY** Enables procedures or functions to be loaded from disc and overlayed into your program as it runs, allowing you to run programs much larger than available memory.
9) **40 to 80** Insert your 40 track disc, 3 minutes later remove the disc which is now in 80 track format and still has all of your programs on it.
10) **DUAL CATALOGUE** Enables 61 files to be saved per disc surface instead of just 31.
11) **FORMAT** A speedy program to format or verify 40 and 80 track discs.

MASTERFILE II

The Powerful Disc Database

- ★ **Combines with Wordwise/View to produce standard letters**
- ★ **Ideal for Home, Business and School**
- ★ **Fast, Powerful and Simple to use**



```
         BEEBUG MASTERFILE II

A. Set up file name
B. Enter record description
C. Look/alter a record
D. Printer configure
E. Open file
F. Initialise/Clear file
G. Enter search data
H. Print/Search file
I. Sort
J. Transfer/append files
K. Compact the file
L. Global field calculation
M. Activate 'TAG' file
N. Utilities
O. Form design
P. Stop the program
OPTION?
```

MASTERFILE is a general purpose file management package allowing large amounts of information to be stored and processed. It is extremely powerful yet flexible and easy to use.

Once set up, the information may be retrieved, sorted on any field, displayed, updated, printed etc, as required.

FEATURES INCLUDE:

- Up to 18 fields per record.
- Field size of up to 255 characters, record size limited to one screen.
- Any number of records per file (up to the full capacity of one disc surface).
- Field types of string, integer, numeric, decimal and date.
- Flexible data entry and update.
- Fast tag sorting (typically sorting 200 records a minute) and allowing subsets to be created.
- Spreadsheet-like facilities allowing global updates.
- Information on the database may be printed in almost any format and may include text from Wordwise or View files.
- Special multi-label printing facility.
- Output may also be spooled for use with Wordwise or View.
- Fully 6502 second processor compatible.
- Supplied with a comprehensive manual.

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DISCMASTER £19 *(Dual format disc)*

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Save memory with overlays

Vol. 3 No. 3 May 1985

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ABC 68,328
January-June 1984

The Micro User welcomes program listings and articles for publication. Material should be typed or computer-printed, and preferably double-spaced. Program listings should be accompanied by cassette tape or disc. Please enclose a stamped, self-addressed envelope, otherwise the return of material cannot be guaranteed. Contributions accepted for publication will be on an all-rights basis.

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You'll be seeing spots before your eyes with this simulation of the favourite pub game.

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Now your Micro can literally "tell" you the time as this month we build a speaking clock.

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Hand over the presentation of your slides to your micro. SHEILA will do all the work!

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From back issues to binders, cassettes to cases, discs to dust covers – they're all here.

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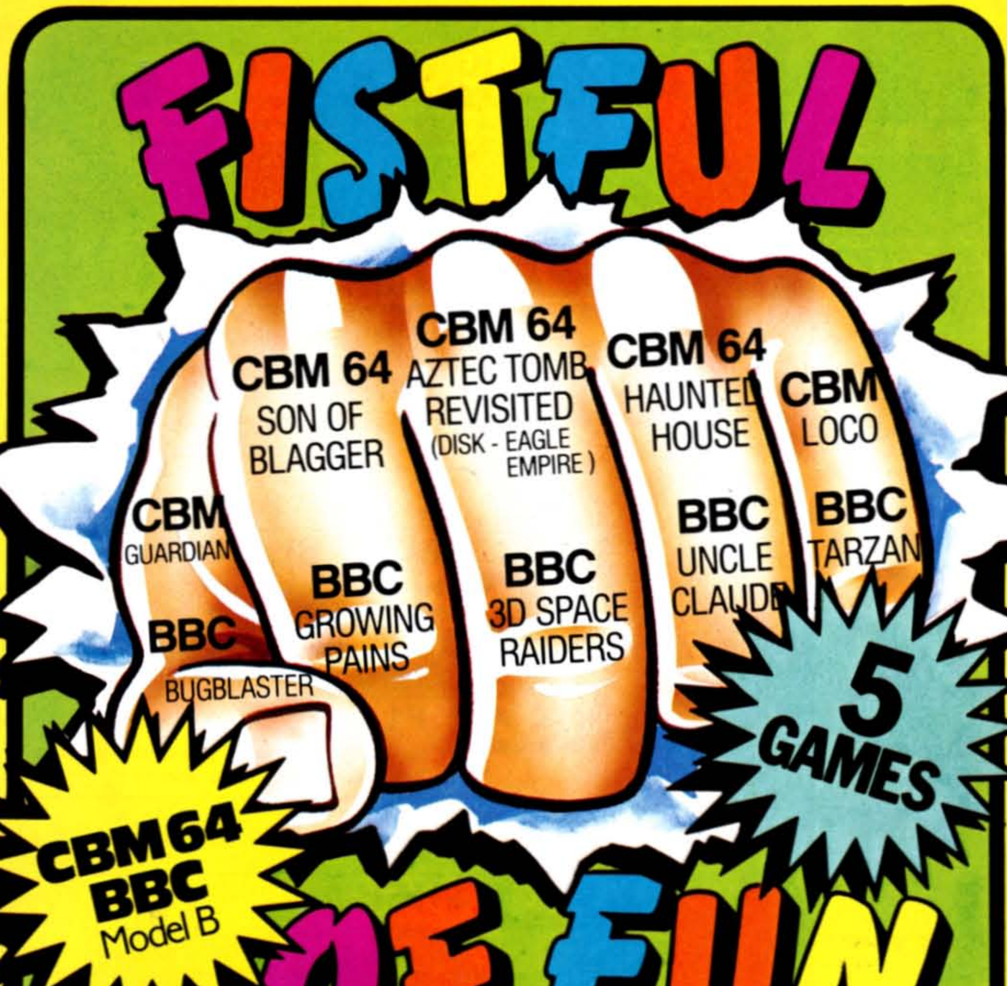
MicroLink

You'll find there's an exciting new world waiting to be explored at the other end of your telephone line. All you need is your BBC Micro, a modem, suitable software – and you're away!

To find out more turn to Page 152

GET YOUR HANDS ON A...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Your BBC would not be without it

Solidisk Sideways RAM is indispensible to all BBC computers

SOLIDISK's SIDEWAYS RAM is an almost indispensible add-on for the BBC user.

It is available in either 32k, 64k or 128k byte capacity and is compatible with all issues of BBC microcomputers along with most of the add-ons and ROMs obtainable for it.

To date, more than 37,000 units have been sold.

The Sideways RAM occupies the right most ROM socket of the BBC and sits in the same position in the micro's memory map as the paged ROMs.

This means that the Sideways RAM can run almost all ROM type software including languages, utilities and filing systems.

The difference between Sideways RAM and Sideways ROM is that RAM can be written to meaning that only the presently required software has to be loaded into the machine, thus making redundant the multitude of high current consumption and often unsightly ROM extension boards.

Sideways RAM is also an invaluable tool for writing ROM type software to run on the BBC since software may be assembled straight into the area in which the final version will run. This will save a lot of time over using offset assembly and eprom programming/erasing on a non Sideways RAM equipped BBC.

For the user who is not interested in writing ROM type software but is in need of the utilities provided by the use of the Sideways RAM, we supply free software to make maximum use of the Sideways RAM facilities.

These are included in the Sideways RAM Software package, a collection of no less than 5 diskettes containing nearly 100 programs, from database, word processor, music system, sprite graphic, printer buffer, virtual memory, spelling checker, RAM disk, RAM filing system, VDU replay, disassembler, machine code monitor, macro basic, video digitised pictures etc. and Solidisk Most Advanced Disk Filing System version 2.0.

Another extremely useful feature is the ability to configure the Sideways RAM as a 'SILICON DISC' as in our STLDISC program. It makes use of available Sideways RAM as an extra disc drive.

Once the STLDISC program is loaded it acts exactly like a normal DFS with the exception that one drive is now allocated to the Sideways RAM. All operations on this drive are much faster than a physical disc drive and, of course, impart no mechanical wear to them. This means that programs may be repetitively loaded, saved, spooled or exec'd many times and only the final version need actually be saved to disc.

The extensive use of the facilities offered in the STLDISC program will allow the physical disc drives to go longer between services and the discs themselves to last longer and could in fact pay back for itself in a fairly short while.

The STLDISC program will operate on any size of Sideways RAM and will configure itself to the available space. Therefore a 16k board will give 4k bytes of storage, whereas the 32k will give 20k bytes and the 128k up to 116k bytes of 'Silicon disc' storage space.

PRICES

The listed price (effective from the 15 April onwards) comprises the Sideways RAM fully guaranteed for 1 year, comprehensive manual and a software package consisting of 5 diskettes formatted either in 40 or 80 track. Please specify when ordering.

— SWR32 (32k unit, by far the most popular): £58.95
— SWR64 (64k unit, new introduction model): £85.00
— SWR128 (128k unit, the second most popular): £149.00

As Solidisk Software Support Service has to produce in excess of 16,000 diskettes every month, we regret that we can no longer provide personalised service for disk copying. In extreme cases, when you need to update your software diskette, either reorder a new software package (which is always sold to you at nominal media cost (plus post and packing) or return the old package with £2.00 to cover post and packing. You may avoid post and packing costs if you call at Solidisk's stand at any BBC micro exhibition or at the Solidisk office.

UPGRADING

Upgrading from a smaller model is very simple: you return the old RAM board to us with your payment.

The listed prices include the full software package and new manual.

THE SOFTWARE PACKAGE

The Software package comprises of 5 diskettes, formatted either in 40 or 80 track. Please specify when ordering.

Volume 1:
Volume 1 contains all the general applications of Sideways RAM such as load and save ROMs (the Menu program), printer buffer (the Printer program), Improved Disk Filing System with unlimited catalog or PAGE at &E00 (STL0E00 and 2.0 ROM), Silicon Disc (the STLDISC program), the Quickcopy and the Fast Backup programs which use Sideways RAM to save you time and disk swapping effort.

Volume 2:
Volume 2 contains the Wordprocessor, Spelling Checker and the English Dictionary.

Volume 3:
Volume 3 contains the Macro Basic (a program generator), a Linker-Editor and the Virtual Memory Program, which lets you use Sideways RAM to store Basic programs thus allowing otherwise too large programs to run.

Volume 4:
Volume 4 contains a suite of programs, all part of the Solidisk Database system. This Database allows you to retrieve any record of up to 6500 records quicker than you can remove your finger; each record can have up to 15 fields of up to 60 characters long. 15 utilities are included allowing printing of forms, tabulation, mailmerge, maths etc.

Volume 5:
Volume 5 contains extensive programming aids such as the powerful Solimon, the 65C02 assembler, the Solitrace, a dual screen tracing utility, the Invisible trace, the Sprite and Sprite generator capable of moving 32 sprites anywhere in a single picture frame, the VDU Recorder, which mimics a £10,000 graphic computer and more.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

WHAT THE SPECIALISTS SAY:

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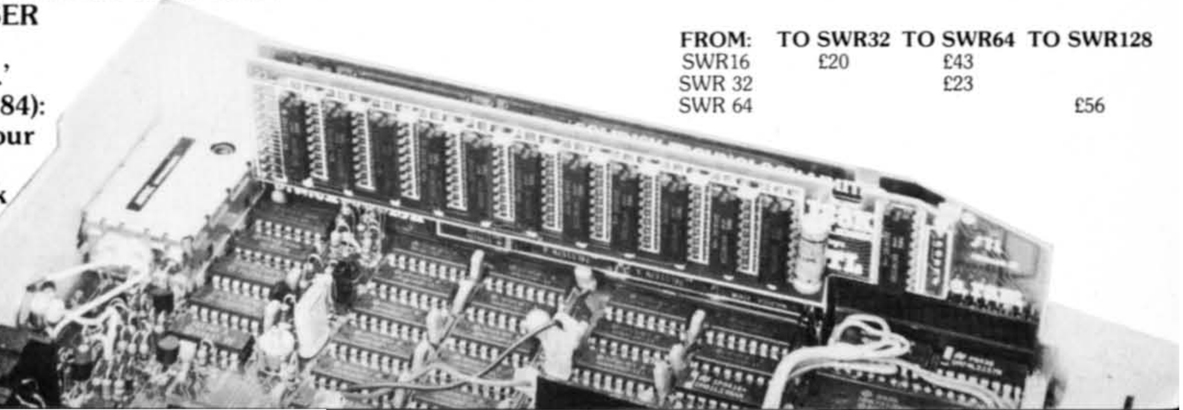
'Power to your BEEB'
A&B: 'Break the RAM barrier'

FROM:	TO SWR32	TO SWR64	TO SWR128
SWR16	£20	£43	
SWR 32		£23	
SWR 64			£56



Introduced only last November the SOLIDISK DDFS has enjoyed an unprecedented popularity in a very short time. We think the reason for this is the ease and simplicity of installation and use, along with the capability of 60% extra disc capacity in the Double Density mode. This coupled with realistic pricing makes our DDFS an absolute best seller.

WHICH DFS DO YOU NEED?

SOLIDISK produce no less than three types of Disc Filing Systems to cover all your requirements.

1. THE FLEXIBLE DDFS

The basic SOLIDISK DDFS (£38.95) is suitable for all ordinary users. It is supplied with the SOLIDISK 1.9 ROM. This ROM is compatible with the ACORN DFS; running all unprotected commercial software and disks from Acornsoft (Elite), Micro Power (Castle Quest), Island Logic (The Music System).

The 1.9 ROM offers both single and double density formats, with built in disc formatter and verifying, along with such features as automatic density sensing and 40/80 track software controlled switching. The speed is now programmable by the keyboard links to suit almost any type of disc drive and the maximum file size is now only limited by the capacity of the disc.

The DDFS can now be supplied with the Solidisk Most Advanced Disc Filing System (our 2.0 ROM). The total price of this system is £48.95 and the specifications are outlined below.

2. THE FAST 8″ CONTROLLER

This a totally new product intended for the business user where speed and reliability are paramount.

The date transfer rate of the 8″ look alike is double that of a standard 5.25″ double density formatted disc or an amazing four times that of a single density formatted disc. This gives a data transfer at the incredible speed of 500kbits or 64 k bytes a second.

This DDFS can be used with either 8″ disc drives or the Mitsubishi 8″ look alike or a mixture of the two.

Ideally suitable to be used with the Mitsubishi M4855 80 track double sided (2 MB unformatted or 1.3 MB formatted), the 8″ DFS costs only £69.95 inclusive.

STL
SOLIDISK TECHNOLOGY LIMITED
SOLIDISK DISK FILING SYSTEM
7,000 SOLD

3. THE SEDUCTIVE DFDC

Ideally suitable if you already have an Acorn DFS. The DFDC will not only add Double Density capability but also improve the speed of your 8271 chip. The SOLIDISC DFDC (Dual Floppy Disc Controllers) is making a very large impact on the BBC user community with its extraordinary capability. It is currently supplied with the Solidisk Advanced Disk Filing System ROM 2.0 (£54.95).

The DFDC board simply sits in the place of the 8271 FDC chip (i.c.78) in the BBC. The 8271 is then inserted into the DFDC board and the ROM 2.0 inserted in place of the original DFS ROM.

Once the machine is up and running it is then simplicity itself to change FDCs; just throw the switch attached to the DFDC board, press BREAK and the other FDC is now selected.

This allows the user to get the best facilities available from both the 1770 and 8271 floppy disc controller chips with the minimum of fuss.

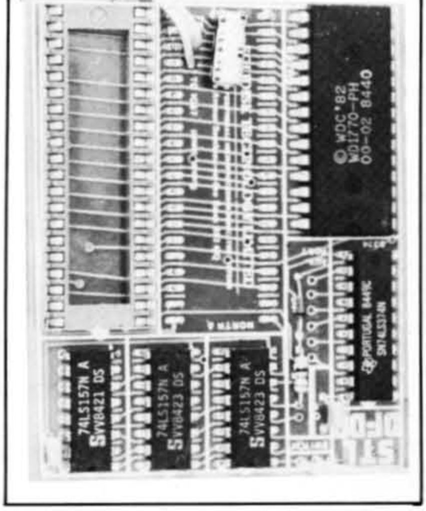
The DFDC board may also be used as a Stand Alone DFS if your BBC is not yet upgraded for disc systems. All the necessary chips and instructions are supplied and the 8271 may be added as an optional extra at a later date.

The SOLIDISK DDFS is now the ultimate in reliability with a minimum component count and software error trapping.

The DDFS consists of only 4 components to be plugged in to the BBC Microcomputer and can be fitted in just a few minutes by novice and expert alike.

Whilst many other manufacturers rely heavily on distribution outlets to do the selling for them, SOLIDISK relies on a good product and a large support network to win the heart of the user. With over 60 local experts, covering England, Scotland and Wales, a SOLIDISK National User Group in Holland and soon in Australia, SOLIDISK can offer many users regional free fitting and advice. Also with an ever increasing catalogue of free software, available to all SOLIDISK users, comprising of Programming tools, Graphic windows, Musical tunes, Spelling checker, Computer Aided Design, Disc utilities etc., even users who are new to the DDFS can expect to build up a large disc program library in a fairly short time.

Solidisk Software Support Service now has a responsibility to over 35,000 users and the ability to give you the best possible support matched only by the largest companies.



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17 SWEYNE AVE, SOUTHEND-ON-SEA,
ESSEX SS2 6JQ
TEL. SOUTHEND (0702) 354674 (10 lines)

SOLIDISK DFS ROM 2.0 IS OUT:

The Solidisk Advanced Disk Filing System for the BBC computer is now available for both Solidisk DDFS users and Acorn DFS users as an upgrade for the DNFS 1.2ROM.

Standard features include:

1) Unlimited Catalogue entries (up to disc capacity) without any special preparation.
With Computer Concepts's Disc Doctor or Watford's DFS, you have to specify BEFORE formatting if you want 62 filenames. Once formatted, you can no longer modify the format.
With ROM 2.0, there is no limit to the number of files and programs you can have on the same diskette. Until it is completely full.

2) Unlimited filesize.
This feature is sometimes a very good sales argument for databases.

3) Automatic Write Error Correction.
Every disk write operation is immediately followed by a read operation to ensure that the recorded data is free of all errors. Then if needs be, ROM 2.0 will restart the write operation from the unsafe sector.

4) Automatic 40/80 track stepping.
No other DFS allows you to directly backup a 40 track disk to an 80 track disk, even if you have a switchable disk drive, since the hardware cannot replace the software! ROM 2.0 allows you to backup and copy any 40 track disk to 80 track, single to double density (if available) even on the same drive without any special care.

5) DISC REPAIR FACILITIES.
Disc sector editor (*DZAP), memory editor (*MZAP), recover good sectors (*RECOVER), re-write multiple sectors (*RESTORE), Read disk format (*R40 and *R80), recover bad sectors and bad track (*RTRACK), repair and restore bad sectors and track (*WTRACK) and the powerful disc copy (*DCOPY) which is capable of duplicating even some non BBC disks in under 1 minute in both single and double density (if available).

6) Tape to disc facilities.
This facility allows automatic transfer of all programs and most games to disk (*TAPEDISC and *LOADTAPE). Only in some cases (multi-part game cassettes), will you need Clare's utilities.

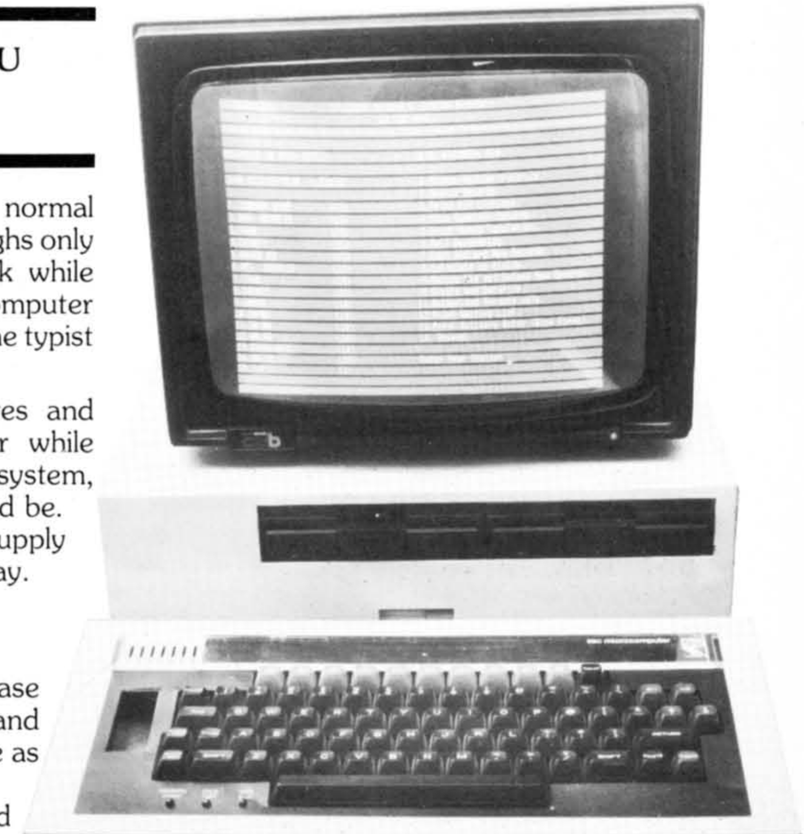
7) Wordprocessing facilities.
This facility allows !BOOT and other text files to be edited, saved and printed. Any screen mode and text up to 24k can be handled.

8) PRICE
The 2.0 ROM costs £20.00 to all Acorn DFS users. Included in the price are the Advanced DFS User Manual and VAT.
As an upgrade for the 8k Solidisk DDFS 1.9, the price is only £10.00 inclusive. Please note that you do not have to send back your present DDFS ROM when ordering, but post it later in the return envelope sent together with the 2.0 ROM, quoting your credit card number as a guarantee.

SOLIDISK KEYBOARD AND CPU ARE NOT JUST PRETTY . . .

The keyboard is 12 mm lower than the normal BBC case, 2-3 degrees more angled, weighs only 5lbs, does not skid about on the desk while enjoying 2 feet of freedom from the computer unit — and makes a lot of difference to the typist (even 2 fingered ones!).

The CPU accommodates 2 disk drives and withstands any heavy weight monitor while providing easy attachment for the whole system, CPU and disk drives, to the desk if need be. There is good ventilation to the power supply too and all untidy cables are hidden away.



PRICE

The complete CPU and keyboard case costs £30.00 inclusive + £3.00 post and packing. The system could be yours free as part of the Mitsubishi twin discs offer. Actually the best thing that happened to the BBC computer for a long time!

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

SOLIDISK + MITSUBISHI BIG DEAL:

THE MITSUBISHI 640K DISK OUTFIT:

This offer comprises:

— One Double Sided, 80 track Mitsubishi M4853 disk drive, cased in beige.
— One Solidisk DDFS Single and Double Density Disc Upgrade.
— All leads and manuals (2).
— One Software package comprising 5 program diskettes as detailed below.
— Full one year guarantee.
— All for £209.95 inclusive of VAT and carriage.

IMPORTANT

If you upgrade (now or later) to twin Mitsubishi M4853 disk system, Solidisk will offer you, subject to stock availability, absolutely free a CPU and keyboard case as shown earlier.

For that, you have the choice of ordering a 640k Mitsubishi disk outfit now and then later on, of returning your disk drive, enclosing payment of £160 to cover the second disk drive and carriage. Alternatively, save by ordering right now a complete twin Mitsubishi (2MB unformatted, 1.3 MB formatted) Fantastic Offer at only £359.95 inclusive.

THE HARDWARE:

As described earlier as shown opposite.

STL
SOLIDISK TECHNOLOGY LIMITED
SOLIDISK DISK FILING SYSTEM
SOLIDISK DDFS USER MANUAL (Part 2)
DataLife
Verbatim

THE SOFTWARE:

The software comprises 5 diskettes, formatted in 80 tracks. Volume 1 contains the Word Processor, Volume 2 the Database, Volume 3 the new Spreadsheet 1.1, Volume 4 the disc, tape utilities and a blank dictionary.

It would take several pages to describe them all. In general, they are of the highest standard as our hardware products. Only the first 2 volumes will be described below.

Volume 1:

Solidisk Word Processor and Spelling Checker with English dictionary. Easier than View, Wordwise or Scribe, you enter the WP by *WP (filename), then start typing. What you see on the screen will be exactly printed on paper.

You don't even need to read the manual twice, the most useful commands are all displayed on the top part of the screen.

This Word Processor features 80 column screen throughout, direct on screen justification, automatic margins, page numbering, printer special commands, Wordstar like editing commands for block move, block delete, block copy, print, save, load text to cursor, insert and overwrite, search and replace, total word count, word frequency count, free space, * commands etc, etc.

Solidisk WP loads and saves texts under 1 second flat and also you may save the edited version as many times and under any filename you like.

And also better than any other wordprocessor, you can spell check your document without leaving it, simply type in Control-U.

It has self dictionary generating capability too. You may create any dictionary you like simply by entering the words.

Solidisk WP is also excellent as a training tutor for Wordstar, as used on most 16 bit computers.

Volume 2:

Solidisk Database. Solidisk Database is a random access system, completely menu driven and more importantly, very easily customised to suit any particular need.

Important features include unlimited filesize and number of records, all maths functions and 80 column screen throughout. Solidisk Database is particularly simple to understand and easy to use. You are first presented with an option menu, which comprises 15 different options. Each option will then lead to a new menu and so on. Mostly you only have to enter an appropriate data or hit the RETURN key.

You can design a new database, list all records, edit them, merge them, split them, making mailshot with Solidisk WP etc. For instance, Solidisk telephone enquiries are dealt with by an ordinary BBC with twin Mitsubishi holding the last 4000 sales records. Typing in the name you retrieve the complete record quicker than you can remove your finger. It of course runs Solidisk Datafile.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

NEW PRODUCT ANNOUNCEMENTS

Solidisk MODEM.
Single chip FSK, Multistandard internal MODEM, requires no soldering, no adjustment.
Supplied with Menu Driven SoliComms 16k ROM, ready to be connected to any information provider such as Prestel or Gold.
Auto dialling, auto answer, auto baud rate, auto error correction.
Available soon. Price: £39.95 inclusive.

Solidisk Third Processor
Internally fitted 6502 compatible with Acorn Second Processor, 128k as standard, upgradable to 256k, 4 Sideways ROM sockets, software supplied in ROM allowing unused RAM to be loaded with Sideways Software or used as Silicon Disk. Available soon.
128k 6502 TP: £179.00 inclusive.
256k 6502 TP: £229.00 inclusive.

acorn electron

IN STOCK:

1) NEW LOW PRICE EPROMS.
2764s and 27128s are going down in price.
5 x 2764s now cost you only 24.95 per pack.
3 x 27128 now only 25.95 per pack.

2) PLENTY OF UVIPROMS AND UVIPACS.

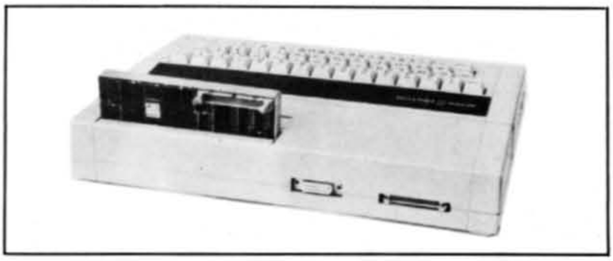
3) ELECTRON DISK INTERFACE.
This interface is BBC compatible and includes 3 Sideways ROM sockets.
It Plugs into the PLUS-1 and allows direct attachment of disk drive and software compatibility with BBC disks.

PRICE: £39.95 inclusive, P&P: £1.00.

SOLIDISK LOCAL EXPERTS

We have people able to fit your equipment free of charge in all the following towns. If your area is not mentioned, ring the office!

Dunstable, Leighton Buzzard, Reading, Peterborough, Wimslow, Penzance, Torquay, Wimborne, Basildon, Stroud, Southampton, Hoddesdon, Watford, Bexley, Margate, Rochdale, Boston, London (all areas), Oldham, Hunts Cross, East Dereham, Rushden, West Bridgford, Wantage, Bambury, Grimsby, Kingston, New malden, Woking, Taunton, King Norton, Sutton Coldfield, Halesowen, Leamington Spa, Hassocks, Salisbury, Swallowne, Leeds, Huddersfield, Treowen Newtown, Newtownards, Co Fermanagh, Co Londonderry, Le Mesnil St Denis (France), Kalgoolie (Australia), Paramatta (New Sth Wales), Manawatu (New Zealand).



Short form price list. Full price list on request.

Qty Items	Prices	P&P
Sideways RAMs:		
SWR32	£58.95	£1.00
SWR64	£85.00	£1.00
SWR128	£149.95	£1.00
CPU & Keyboard		
Case (both)	£30.00	£3.00
Solidisk DDFS.		
DDFS (with 1.9 ROM)	£38.95	£1.00
DDFS (with 2.0 ROM)	£48.95	£1.00
DFDC (with 2.0 ROM)	£54.95	£1.00
8" Controller	£69.95	£1.00
Special Offers.		
640k Disc Offer	£206.95	£3.00
1.3MB Fantastic Offer	£356.95	£3.00
Eprom Equipment.		
Programmer	£19.95	£1.00
Eraser	£19.95	£1.00
2764 x 5 new low price	£24.95	£1.00
27128 x 3 new low price	£25.95	£1.00
Datalife Diskettes.		
MD525 SS/DD	£17.00	£1.00
MD550 DS/DD	£22.00	£1.00
MD557 2S/4D	£28.00	£1.00
65C02 with Software	£13.00	£1.00
Solimon-2 16k ROM	£13.00	£1.00
2.0 DFS 16k ROM	£20.00	£1.00
	Total =	

Name: ______________________________

Address: ____________________________

____

____

Barclay/Access: ☐☐☐☐☐☐☐☐☐☐☐☐☐☐

Prices and specifications correct at time of going to press: we do reserve the right however to change without prior notice.

SOLIDISK TECHNOLOGY LIMITED, 17 SWEYNE AVE, SOUTHEND-ON-SEA, ESSEX SS2 6JQ. TEL. SOUTHEND (0702) 354674 (10 lines).

Herbie Briggs has just destroyed the myth that all floppy discs are created equal.

They seem equal. Until you look at the seams.

That's where equality ends.

Most companies seal their discs with a spot here, a spot there. Leaving most of each seam not sealed at all.

Sooner or later, the seams might do what comes naturally: they bulge. Warp. Pucker. Open up.

Pens, pencils, fingernails—even a four-year-old's, like Herbie—can catch and snag in those wide open spaces.

That's sloppy. And dangerous. Because if you put a sloppy floppy into your disc drive, it can jam your drive. Ruin your drive head. Lose your data.

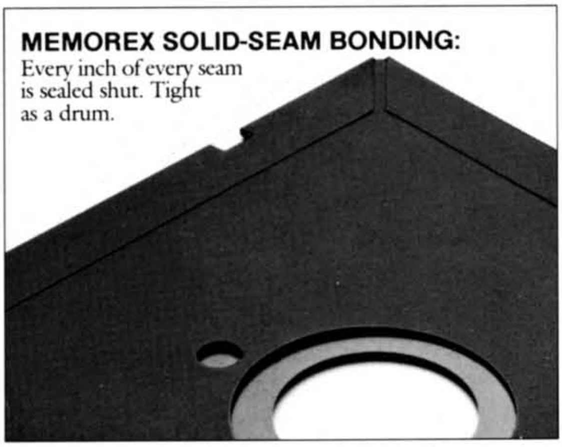
So much for their seams. Ours are different.

THE SLOPPY FLOPPY:
Sealed with a spot here, a spot there. Leaving unsealed seams everywhere.

Memorex uses a process we developed, called Solid-Seam Bonding.

Solid-Seam Bonding seals shut every inch of every seam of every Memorex® floppy disc. Tight as a drum. That makes the Memorex floppy stiffer. Stronger. And your data safer.

To resist bulging, warping, puckering, or opening up.



MEMOREX SOLID-SEAM BONDING:
Every inch of every seam is sealed shut. Tight as a drum.

To resist all the things that can jam your drive, ruin your drive head, or lose your data.

Which proves that a Memorex floppy disc isn't equal to all the others. It's better.

Solid-Seam Bonding is just one example of the extra care that goes into every Memorex floppy disc. Be it 8," 5¼" or the new 3½." Extra care that lets us guarantee every Memorex disc to be 100% error-free.

The next time you're buying a floppy disc—or a few hundred of them—just remember this:

It's always better to be safe than sloppy.

For more information on the full line of Memorex quality computer media products, including computer tape, call Memorex U.K. Ltd.,
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Your Data. When it matters, make it Memorex.™

MEMOREX

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Link to Giant Mainframes and network to thousands of Micro users via your 'phone with free Modems and Comms software in the British Telecom Modem competition.

British Telecom is offering 1000 free gift packs to plug direct into your home 'phone line.

British
TELECOM

MODEM COMPETITION

1000 FREE MODEMS

500 for Spectrum/Spectrum +
350 for BBC Model B
150 for Commodore 64

And if you haven't got a square-type BT phone socket, British Telecom will arrange to alter your installation at no charge!

HOW TO ENTER

(Monday 22nd April to Sunday 5th May 6pm to midnight)

For the 5 questions 'phone
01-627 3000 or
021-449 9944 or
031-225 8999

To get the Tiebreaker Sentence 'phone
01-627 1199 or
0532 455030 or
0632 324444

Complete the entry form using your skill and judgement, and send it off in the next post.

RULES OF THE BRITISH TELECOM MODEM COMPETITION

1) The dial-in is available from 6pm Monday 22nd April to midnight Sunday 5th May 1985, when the competition closes.
2) Entries must be postmarked the next working day after the questions and tiebreaker were obtained.
3) Entries can only be made on the official entry forms and become the property of British Telecommunications plc.
4) The competition is open only to residents of the United Kingdom over the age of 18 years. Employees of the Network Marketing Unit of British Telecommunications plc and PARKER REDMILE LTD. and their dependants are excluded. Only one winning entry per household.
5) Entries not reaching the competition address before midnight on Thursday 9th May 1985 will not be considered.
6) A list of winners will be provided at the competition address. Please send an SAE if you wish to receive it.
7) The winners will be picked as follows from entries received on time and properly completed –
The entries for each type of prize pack with all correct answers to the 5 questions and with the tiebreaker sentences judged most apt and humorous by the competition organisers will be chosen, subject to the stock of appropriate prize packs.
8) The decision of the competition organisers is final and no correspondence will be entered into. Winners will be notified automatically.
9) British Telecommunications plc offers winners requesting BT 'phone socket conversion on entry forms to waive the charge normally made for such work.
10) Details of how to get on Prestel/Micronet 800/Telecom Gold will be sent to winners. Subscriptions not included in prize.

OFFICIAL ENTRY FORM

A. Your answers:
Q 1
Q 2
Q 3
Q 4
Q 5

B. Tiebreaker Sentence complete (25 words or less in total):
"
"

C. If I win, I would like the prize pack for the
☐ SPECTRUM/SPECTRUM +
☐ BBC MODEL B (Tick Choice)
☐ COMMODORE 64
MU

D. My home telephone line (* Delete as appropriate)
(a) already has a square-type BT 'phone socket * or
(b) would need converting to square-type BT 'phone socket *
If (b), the person renting the line from British Telecom must fill in this declaration – If this is a winning entry, I agree to ask British Telecom to convert my line to square-type BT 'phone socket at a convenient date before 1st July 1985. My line is on Residential rental, is not a coinbox and is not shared service. I understand British Telecom will not charge for doing the work.

Name (Block Capitals)
Telephone number
Signature
Date 1985
MU

E. I have read the rules of the British Telecom Modem competition and agree to abide by them. I am over 18 years old.

Signature of entrant
Date 1985
Name (Block Capitals)
Address
Postcode
MU

POST IMMEDIATELY TO:–
British Telecom Modem Competition
PO BOX 73
MITCHAM
SURREY
CR4 2XU
(Postage stamp required)

WINNERS WILL BE NOTIFIED AUTOMATICALLY

British Telecommunications plc. Registered Office 81 Newgate Street LONDON EC1A 7AJ. Registered in England no. 1800000

QUALITY NEVER LOOKED SO GOOD–

Now everyone with a BBC or IBM PC will want to get their paws on CUB's sleek new D series plastic cabinet – a triumph of ergonomics and up to the minute design. Within it is the CUB 653 MEDIUM RESOLUTION colour monitor – the perfect mate for computer users who wish to combine the advantages of brilliant, low cost colour graphics with 80 column processing software.

CUB 653's remarkable depth of colour is enhanced by minimal screen glare, thanks to a super high contrast CRT. Even in well lit environments the 653 (H) × 585 (V) resolution and 0.43mm dot pitch produces 80 column text which is pin-sharp and easy to read. Owners of SHARP, RML 480Z, APPLE Series, WANG and other leading computers needn't feel left out, because CUB 653's compatibility extends to these models and many more.

PICK ONE UP FOR JUST £299 inc. VAT

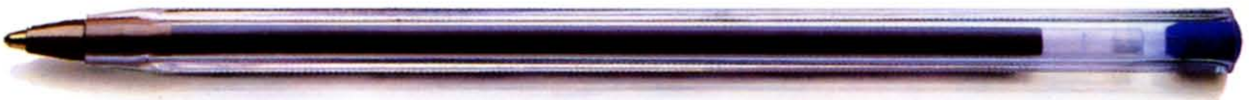
NEW LOW PRICE, NEW PLASTIC CABINET – THERE'S NEVER BEEN A BETTER TIME TO BUY.

Standard Resolution version also available in new cabinet. Both Standard and Medium resolution models produced in metal cabinets if required.

MICROVITEC 653
CUB
COLOUR DISPLAYS

Microvitec PLC, Futures Way, Bolling Road, Bradford, BD4 7TU, West Yorkshire.
Tel: (0274) 390011 Telex: 517717

Available from High Street Computer Retailers and selected branches of W. H. Smith, Harrods, John Lewis Partnership, John Menzies with selected models available from larger branches of Boots.



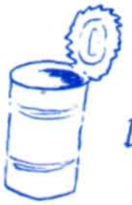
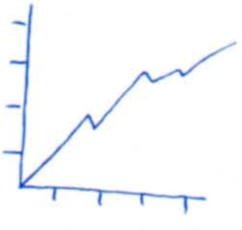
Really inexpensive way of writing down whatever comes up on your computer screen.

Lightweight and totally portable — independent power source!

Normal, EMPHASIZED, CONDENSED and ENLARGED print.

Works perfecty in the dark even during a power cut!

45 characters per second (only in optional "totally-illegible-squiggly-line" mode).

 DO  ICS.

Dear Me,
Even writes letters!

The new, portable Epson P40.

Now the home computer user can have a true business quality printer, from Epson – maker of the world's most popular printers.

Our new P40 is only £99.95 – that's including VAT and recharger. It's suitable for BBC, Sinclair, Commodore, Oric and almost any other popular home computer, as well as virtually any portable or desk top micro.

Running off its own rechargeable batteries as well as mains, your P40 is totally portable and being Epson, an absolute doddle to use. And though particularly compact it even gives you 80-column width printing in condensed mode.

So wherever and whenever you want to print, now you can – with the new, portable Epson P40. In fact, anything a ball-point does, it can do – better. See it at selected branches of Boots, or ring 01-200 0200 for details.

EPSON

AMX MOUSE

Catch an incredible AMX MOUSE! The advanced opto-mechanical device that brings to your BBC micro facilities once only available on more expensive computers. Now you can use ICONS, WINDOWS AND POINTERS in your own programs.

AMX PACKAGE

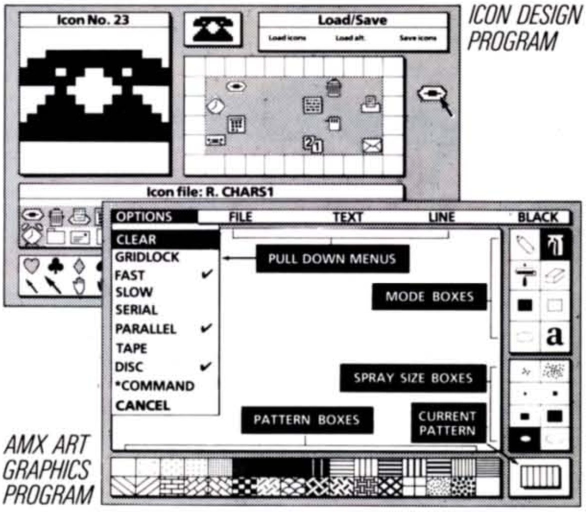
Plug the MOUSE into the user port, and the EPROM into your board. The latter contains fast machine code routines for creating on-screen windows, icons and pointers. And means that the MOUSE buttons can be progammed for use with commercial software such as Wordwise and View. There are two manuals included, explaining how to operate the MOUSE and the ROM routines, which are available in both basic and machine code programs.

Included in the package are two superb programs:

AMX ART has to be seen to be believed! It's a computer-aided drawing program that's just as good for serious applications–such as the preparation of detailed architectural and engineering drawings or teachers' worksheets–as it is for having lots of family fun! And if you're artistically inclined, you'll be astonished at the quality of work you can produce and save. It makes full use of on-screen menus, pull-down menus and icons: the ideal, easy way for novices to learn and gain in confidence.

ICON DESIGNER is an invaluable program for creating and storing icons for use in your OWN programs.

The AMX MOUSE may be used with any BBC Model B fitted with the Operating System 1.2; and it's compatible with the 6502 second processor and disc or tape filing systems.


Icon No. 23
Load/Save
Load icons
Load alt.
Save icons
Icon file: R. CHARS1
OPTIONS
FILE
TEXT
LINE
BLACK
CLEAR
GRIDLOCK
FAST ✓
SLOW
SERIAL
PARALLEL ✓
TAPE
DISC ✓
*COMMAND
CANCEL
PULL DOWN MENUS
MODE BOXES
SPRAY SIZE BOXES
PATTERN BOXES
CURRENT PATTERN

ICON DESIGN PROGRAM

AMX ART GRAPHICS PROGRAM

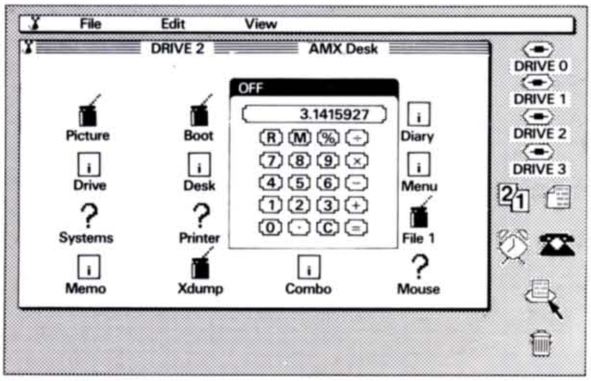
New! AMX DESK

DISC ONLY £24.95 INC VAT

A terrific new program designed for the AMX MOUSE. If you want to get properly organised–at home or at work–DESK is for you!

The main screen contains a desktop with header offering SYSTEM, FILE and EDIT menus–plus an additional menu for extra features; and there's a constant time display.
Down the right-hand side are icons displaying Disc Drives, Memo Pad, Telephone Book, Diary, Alarm Clock, Printer and Trash Can. Simply by using your MOUSE you can select any service you require.

- MEMO PAD–Up to three pages of text may be stored. With printing at the touch of a button.
- TELEPHONE/ADDRESS BOOK–Up to 200 or 400 entries (depending on disc drive capacity) with handy scrolling search.
- DIARY–Displays a calendar for three months, centred on the current month, with scrolling backwards and forwards. Dates with entries are highlighted; select a date and view the entries.
- ALARM–Sounds at the time you've pre-set, whichever DESK service you're using.
- CALCULATOR–A full-function calculator can be brought on-screen at any time, and results can be stored for use in Memo Pad, etc.


File
Edit
View
DRIVE 2
AMX Desk
OFF
3.1415927
R M % ÷
7 8 9 ×
4 5 6 −
1 2 3 +
0 . C =
Picture
Boot
Diary
Drive
Desk
Menu
Systems
Printer
File 1
Memo
Xdump
Combo
Mouse
DRIVE 0
DRIVE 1
DRIVE 2
DRIVE 3

See us on **Mouse Links** on Viewfax tube link on Prestel: **Page No. *258216#**

Any window showing Telephone/Address Book, Diary or Memo Pad may be dumped to the printer by simply selecting the printer icon.
An interface program for Wordwise and View means pictures created with AMX ART can be merged with text upon printing out.

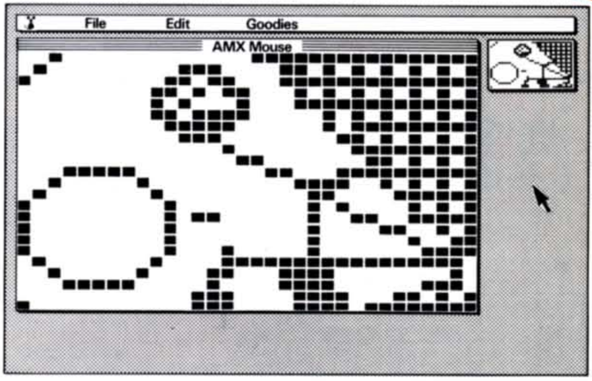
New! AMX UTILITIES

DISC ONLY £14.95 INC VAT

Another remarkable new program for the AMX MOUSE. Now you can enjoy many drawing features you'd never expect to find at this price!

The Zoom facility means easy and accurate amendments to your drawings: one dot becomes a character. You can copy, rotate and reflect; enhance circles; draw ellipses and arcs; and print icons, too. Borders can be added, and pictures can be stripped and centred ready for saving and printing.
There's colour sketch, too...
Great for budding artists!

All disc software is available on 40 or 80 Track and 3" disc. Please state which you require when ordering.

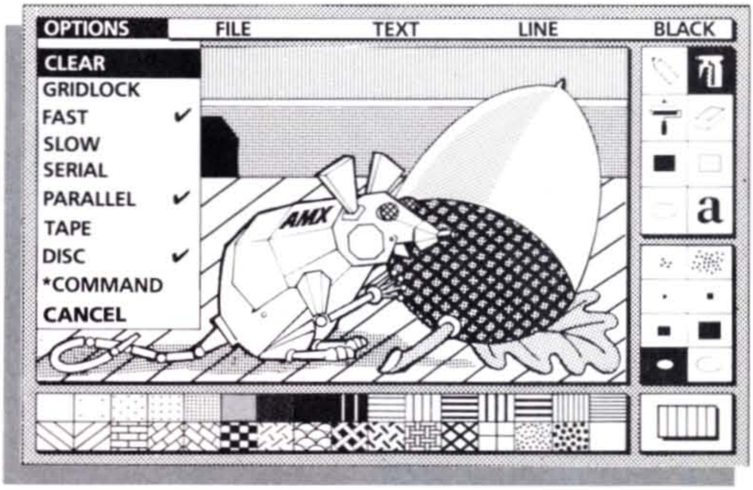

File
Edit
Goodies
AMX Mouse

These exciting AMX products are available from top computer dealers. Or you can order direct from us. Send cheque/PO to Advanced Memory Systems Ltd, Green Lane, Appleton, Warrington WA4 5NG. Ring (0925) 62907)602690 for instant ACCESS and VISA orders.

AMX MOUSE

POINTS THE WAY

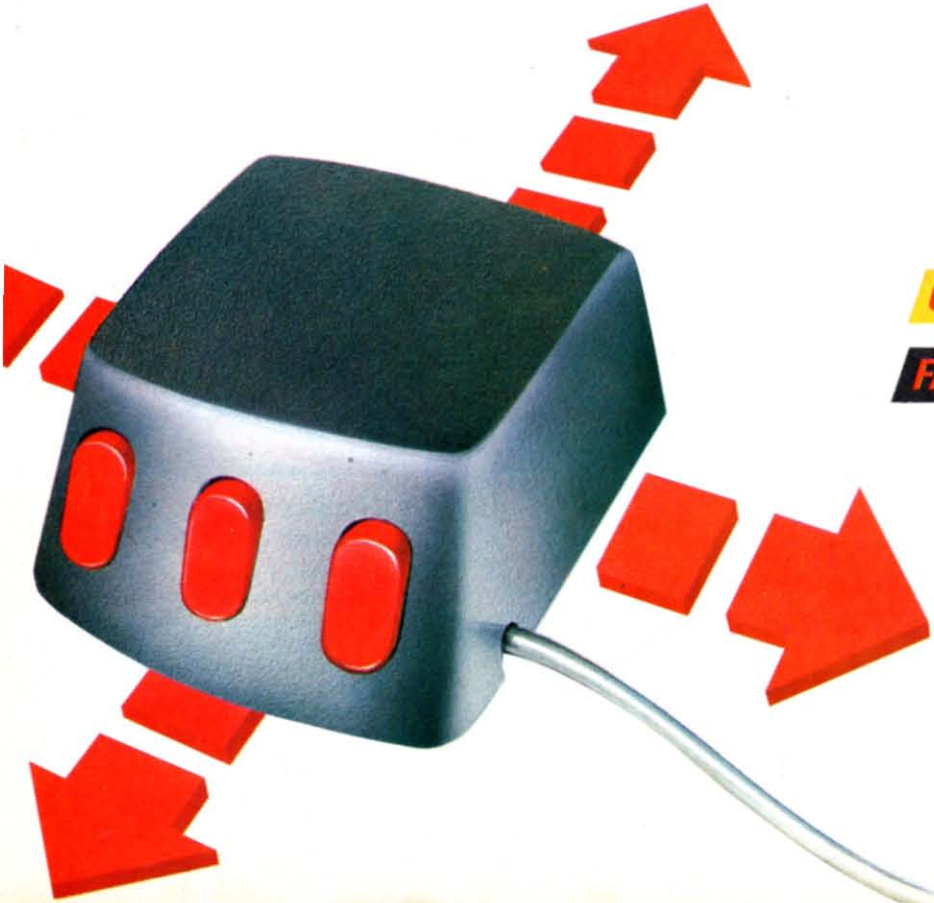
FOR THE BBC MICRO MODEL B



OPTIONS
FILE
TEXT
LINE
BLACK
CLEAR
GRIDLOCK
FAST ✓
SLOW
SERIAL
PARALLEL ✓
TAPE
DISC ✓
*COMMAND
CANCEL
AMX
a

with AMX ART GRAPHICS PROGRAM

EDUCATIONAL QUANTITY DISCOUNTS



ICON SOFTWARE

CREATIVE GRAPHICS

FASTER INTERACTION

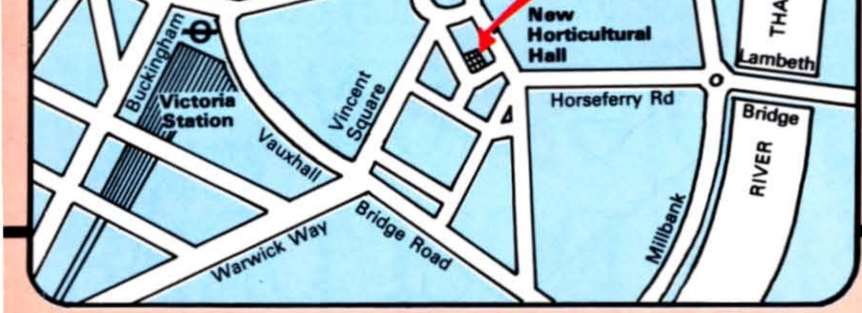
£89.95
inc. VAT and P & P

The BIG show is back in the heart of London!

Thursday to Sunday May 9 to 12

New Horticultural Hall Westminster, London SW1

How to get there


Parliament Square
Westmin.
Bridge
Birdcage Walk
Buckingham Palace
St. James Park Station
Palace Road
Victoria Street
Buckingham
Victoria Station
Vincent Square
Vauxhall Bridge Road
Warwick Way
New Horticultural Hall
Horseferry Rd
THAMES
Lambeth Bridge
RIVER
Millbank
We are here!

Reduced prices for School/College Groups

Entry only £1 per student if bookings are made in advance. Send your cheque (made payable to Database Publications) and SAE to:

Electron & BBC Micro User Show
68 Chester Road, Hazel Grove,
Stockport SK7 5NY.
Tel: 061-480 7863
Valid for a minimum of 10 people.

Organised by
The Micro User
and Electron User

ELECTRON & BBC MICRO USER SHOW

Bigger bargains than ever before at the show that offers the lowest prices possible on all the latest software and hardware for the BBC Micro and Electron

FREE SOFTWARE

Bring a blank cassette and help yourself to software – *FREE!*

Visitors to the Show will be able to access Prestel and download public domain telesoftware from the vast Micronet database. Take your pick from a wide range of games, utilities and educational programs.

Technical
Advice
K9

Got a problem? Then call into our micro clinic

Once again our team of experts will swing into action giving their impartial advice on all technical aspects of computing on the BBC Micro and Electron. We can't promise to answer all your questions, but we can guarantee you'll enjoy watching us try!

SAVE MONEY with our Special Travel Offer . . .

Discounted rail travel offer for visitors to the Electron & BBC Micro User Show. For full details write to:

Travel Offer, P.O. Box 1, St. Albans AL1 4ED with SAE or Telephone: St. Albans 34475 quoting: The Electron & BBC Micro User Show.

This voucher is worth £1 per head!

ELECTRON & BBC MICRO USER SHOW

By handing in this voucher at the door you save £1 off the normal admission price of £3 (adults) and £2 (children).

(Valid for a maximum of 4 people)

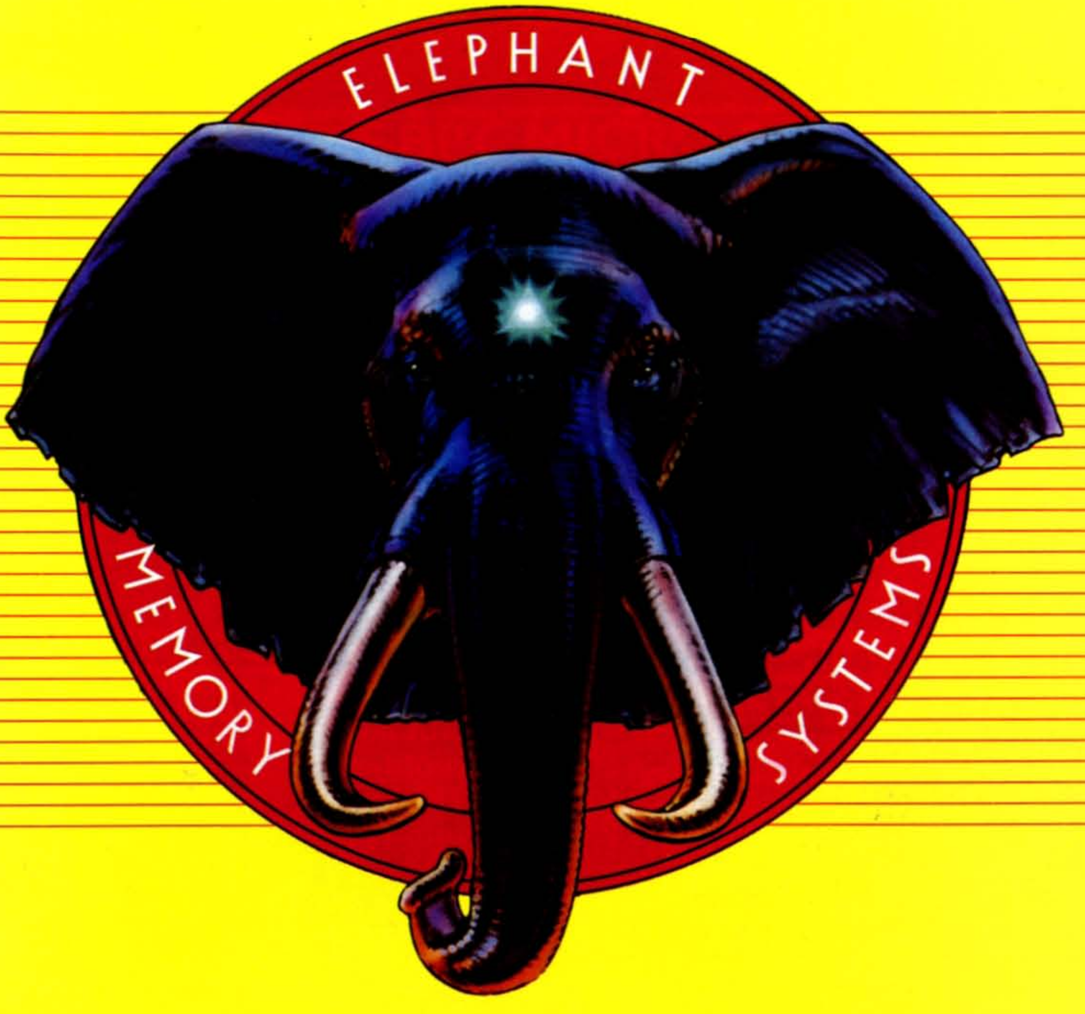
10am-6pm, Thursday, 9 May
10am-6pm, Friday, 10 May
10am-6pm, Saturday, 11 May
10am-4pm, Sunday, 12 May

**New Horticultural Hall,
Westminster, London SW1.**

Number attending: ☐1 ☐2 ☐3 ☐4

MU5

WIN A SAFARI TO KENYA



An opportunity to win a super ELEPHANT Safari for two persons – luxury accommodation, travel and all expenses paid – with every purchase of a 10-disk ELEPHANT pack made between 1st April and 30th June 1985!
Look for your participating ELEPHANT Dealer's special Competition Display and pick up a simple puzzle card with your purchase. Send it to us with an ELEPHANT 10-pack top to receive, completely free, an ELEPHANT 'T' shirt and an opportunity in this exciting competition. Each subsequent 10-pack purchase and completed puzzle card gives you another opportunity – there's no limit!
Should you have difficulty in obtaining ELEPHANT products, phone or write for details of your nearest Dealer.

Dennison

ELEPHANT NEVER FORGETS

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France: Soroclass, 45, rue de l'Est - 92100, Boulogne.
Tel. Réseau de Distribution: 605.98.99, Administration des Ventes: 605.70.78, Telex: EMS 206 436 E
Germany: Marcom Computerzubehör GmbH, Podbielskistr. 321, 3000 Hannover 51, Tel: (0511) 647420, Telex: 923818
Other Countries: Dennison International Company, 4006 Erkrath 1, Matthias-Claudius-Strasse 9, Telex: 858 6600

THE MICRO USER
NEWS
May 1985

National Elite Championships for Micro Show

THE National Elite Championships are to be a major attraction during the forthcoming Electron & BBC Micro User Show. Entered by more than 5,000 of the cult game's diehard followers, six finalists are now to fight it out for the opportunity to win equipment and software to the value of £1,000.

The last stage of the competition will take the form of an Elite-athlon during the four day show to be held at the New Horticultural Hall, Westminster, London, starting on May 9.

As such they will be called on to participate in a marathon playing session which will be held over two days (the Saturday and Sunday).

"They will in fact be called on to play a new second processor version of the game – all colour and with faster graphics – for the final", said an Acornsoft spokesman.

Shortlisted

Elite, which has sold more than 100,000 copies since it was launched, has recently been shortlisted for the Home Computer Software of the Year category in the British Microcomputing Awards 1985.

"It is certainly the most successful game ever for the BBC Micro in that one in every four home users has now bought one", said an Acorn spokesman.

Acornsoft has just revealed it has signed a licensing agreement with Firebird for a Commodore and Spectrum version to be produced.

And observers believe this will result in Acornsoft receiving royalties in the hundreds of thousands of pounds.

"However, the BBC version will still be the best around because of

Turn to Page 24

Acorn is poised for another go at US market

ONLY weeks after closing down most of its United States operations, Acorn is once again poised to make a major thrust into the American market.

For despite losses of £6 million from its previous attempt to establish itself as a force States-side, the company now believes it is on the verge of a breakthrough.

The surprise news was revealed by Joe Black, head of Acorn in the USA, in an exclusive interview with *The Micro User*.

"We are certainly not dead over here", he insisted at his office in Boston.

"In fact, although we may be just ticking over now the whole operation can be resurrected at any minute.

"And this may be potentially a lot closer than most people realise".

The reason for Black's optimism is based on two key factors which have only just come into play.

One is that Acorn's boffins have now developed a revolutionary chip which will allow the specially configured BBC Micro for the American market to run UK software.

The other is that talks are shortly to be held with the giant AT&T corporation with a view to that organisation taking over the distribution of Acorn products in the United States.

"If both of these developments work out in the way we hope then we are certainly back in business in no uncertain terms in the United States", said Black.

The new chip has already proved successful in field trials, although its optimum performance is limited to 80 track software suitable for networking.

Nevertheless, once implemented, it will mean that Acorn will be able to boost the number of titles available for the BBC Micro in America from 175 to more than 500.

"While this certainly doesn't match up to Apple's 10,000 titles, it will enable us to bridge the credibility gap", said Black.

"It will also mean that more and more titles will become available all the time without the present horrendous costs involved in converting".

The problem of limited software aside, Acorn's main stumbling block in the United States has been locating suitable dealers.

However if it succeeds in persuading AT&T to take the company's products on board, then this situation will be rectified overnight for it has one of the most powerful distribution arms in North America.

The inter-company talks, due imminently are a direct result of Olivetti acquiring a major share of Acorn – AT&T owns a 25 per cent stake in Olivetti.

"As a spin off from the Olivetti deal, this would have enormous benefits for Acorn in America", said Black.

The American boss was talking to *The Micro User* on the eve of returning to the UK to take over as sales director of Acorn's newly formed education and training division.

Drive in Canada

CANADA is going to provide a major market for Acorn products in the next few years.

This forecast comes from Joe Black, now returning to take up a new post in Cambridge.

"We recently had talks with education officials in Ontario and they are very keen on our products", he said.

"Being the most populated province, that is where all the action is in Canada.

"Our talks revealed they are much more likely to buy from us than from an American company, as they feel a greater affinity with the UK".

HELP TIME FOR ADVENTURERS

ADVENTURE fans can now get help with their favourite games from Epic Software. The firm has introduced free help sheets for all its BBC Micro adventure games. They are now available for Castle Frankenstein, Quest For The Holy Grail, Kingdom of Klein and Wheel of Fortune.

Each sheet contains hundreds of clues, explaining every item mentioned in the game. Details are also given on how to plot the movements of, and interact with, the characters in Wheel of Fortune.

BBC in line for top award

THE BBC Micro is once again in the running to be named Home Computer of the Year.

It has been shortlisted for the title – which it won last year – in the British Microcomputing Awards 1985.

Recognised as the "Oscars" of the computer industry, the awards "seek to define technological excellence and value for money for the consumer".

Organised by Personal Computer World, The Sunday Times and Thames Television, the winners will be announced at a ceremony hosted by Sir Alastair Burnett in The Park Lane Hotel, London, on June 12.

During the Hollywood-style presentations, each finalist will receive a framed certificate, with specially designed award trophies for the winners.

The proceeds of a souvenir brochure to commemorate the ceremony are to go to the Concerned Micros in Education and Training Charity. "Acorn is naturally very pleased to be nominated once again", a company spokeswoman told *The Micro User*.

"It proves that far from being past technology – as some people have suggested – the BBC Micro is still very much state of the art . . ."

– and Mini Office, too

MINI Office, the chart topping business package for the BBC Micro from Database Software, has been nominated for the British Microcomputing Awards in two major categories.

It has been shortlisted for both the Home Software class and Thames Television's Database Home Software of the Year Award.

Mini Office first hit the headlines because of its revolutionary price – just £5.95 – for a professionally written suite of four programs.

Acorn upsurge

ACORN dramatically increased its UK home computer market share during 1984, according to the latest figures released by leading market research firm AGB.

Over the 12 months, the company's quota grew from just eight per cent to an all time high of 21 per cent for the last quarter.

At the same time – according to AGB – Sinclair saw its sales slump from 45 per cent to 36 per cent, while Commodore dropped from 32 per cent to 27 per cent.

"It is only unfortunate that these figures weren't available earlier to help calm the nerves of the men in the City", said a company spokesman.

While it was the Electron which produced the most significant advance for Acorn – accounting for 15 per cent of total sales during the last quarter – the BBC Micro held its own in difficult market conditions.

MICRONET LAUNCHES A NEW CHATLINE

DEREK Meakin, managing editor of *The Micro User*, took his bow in a world first recently when he agreed to be the guest celebrity on a national show.

For this was a show with a difference in view of the fact there was not a television camera or a radio microphone to be seen.

Instead of being in a studio, Derek Meakin found himself on centre stage seated at his BBC Micro in his office. For this "programme" was going out live over a country-wide computer link-up.

Organised by Micronet 800, Celebrity Chatline now goes on-line for an hour every Wednesday night starting at 7pm.

And, as such, becomes the first event of its type to be held anywhere in the world on a regular basis.

Each week leading personalities in the computer industry are being bombarded with questions from computer buffs all over the country.

In all, several thousand home computer users are estimated to have electronically tuned in to the interactive service for the opportunity to interview the magazine editor live.

Micronet's Claire Walker (left), Derek Meakin and David Babsky (right) prepare for Celebrity Chatline

"It was a fascinating experience to feel I was in direct touch by computer with so many people – including many of our readers", says Derek.

However the one thing that his interrogators were unaware of was that he was using a very special computer during the show.

With the aid of David Babsky and Claire Walker of Micronet, he was sending his replies over on the gold micro, the star prize for *The Micro User's* second birthday contest.

This £5,000 adaptation of the BBC Micro will be presented to the winner of the contest at this month's Electron & BBC Micro User Show at Westminster.

Elite championships

From Page 23

the speed of graphics", said the man from Acorn.

A special stand is being constructed at the show for the final to take place.

"Naturally we are very pleased they have chosen our show as the venue for the final", says Derek Meakin, head of Database.

"It will certainly prove a major attraction at an event which will once again prove to be the launching pad for all that's new in the world of the BBC Micro".

COMPETITION WINNERS

WINNERS of an Echo 1 music system from LVL in *The Micro User* February competition are:

Steve Irwin, International College Spain, Calle Vereda 3, La Maraleja, Madrid, Spain.

K. Gill, 10 Springett Way, Coxheath, Maidstone, Kent ME17 4HQ.

Peter Dominski, 35 Oakfield Road, Coundon, Coventry, West Midlands CV6 1ED.

Golden micro goes on show

THE gold BBC Micro – the unique prize for *The Micro User's* second birthday celebration contest – is currently on a nationwide tour.

Valued at £5,000, it is proving a major attraction in the computer departments of a number of W.H. Smith's largest stores across the country.

This will lead up to the gold micro being presented to its winner during the four day Electron & BBC Micro User Show which opens at the New Horticultural Hall, Greycoat Street, London SW1 on May 9.

In all the machine will have five stopovers during its journey. These will be at W.H. Smith main branches in Manchester, April 1-6; Leeds, April 8-13; Birmingham, April 15-20; Brent Cross, London, April 22-27 and Waterloo, London, April 29-May 4.

Fabulous

The gold micro – the most fabulous prize ever to be given away by a computer magazine – was commissioned from the Universal Communications Company, based in Bradford, West Yorkshire.

Considered to be the leader in the field of customised casings for the BBC Micro, UCC markets its product range under the Oak label.

Within the gold plated processor and keyboard casings, the birthday micro contains a BBC keyboard and motherboard, a disc interface, two 1mbyte disc drives and an 85 watt power supply unit.

"Because it is unique – and, as a result, priceless – we have had to take some extra special security precautions during the tour", says Derek Meakin, managing editor of *The Micro User*.

"However we feel it has been worth it in that it will allow so many of our readers across the country to see it first hand".

Now Micro User helps youngsters get jobs

THANKS to *The Micro User*, Wales now has its own database and 12 youngsters have been trained for jobs in the booming field of viewdata.

Trainees operate the BBC Micro viewdata system

Regular reader Ian Woodroffe is senior supervisor of the microelectronics training workshop at Llandrillo Technical College, Colwyn Bay.

Thumbing through the news section in the January issue of *The Micro User* he came across a story headlined "Jobs going begging in viewdata".

In it Dave Phillips, sales manager of viewdata systems firm ITM, urged schools and colleges to start training youngsters to meet the growing need for viewdata operators.

Phillips said viewdata systems installed by ITM and other firms were creating hundreds of job opportunities but "at the moment schools and colleges haven't woken up to this fact".

"The article certainly woke me up", Woodroffe told *The Micro User*. "For a long time I'd been wanting to establish a Prestel type database that used viewdata or teletext or videotex . . . or something . . . on our BBC Micros.

"Running a youth training scheme is a challenge, and to start a new and innovative training area takes that challenge to the limit.

"There were no other colleges or YTS schemes training anyone on viewdata systems who we could ask for advice – and we couldn't find any reasonably priced software to fill our needs.

"How then could we train 12 YTS youngsters for a fast expanding area which would give them the opportunity of jobs which would last?

"It wasn't until I saw *The Micro User* that the solution became apparent and the project could start rolling".

He telephoned Dave Phillips and arranged a demonstration of ITM's viewdata editing system, Rotaview. It was the answer to Woodroffe's problems.

The hard work of creating the database now began. Says Woodroffe: "Designing the pages had undreamed of rewards with the training programme.

"Some trainees blossomed, others showed a serious side that was not in evidence before. Quiet ones exhibited a talent for expression. More importantly, people were being trained for the future here in North Wales.

"Setting up the database – which we named CymruTel – has brought fun times and a fair share of problems, most of which were due to our own lack of knowledge.

Paying

"However an interesting thing has happened – people want to advertise on the system, so it is paying for itself, not only providing live training but free training".

Newspapers, radio and TV were present on Woodroffe's proudest day when Clwyd MP Sir Anthony Meyer pressed the keys to send CymruTel on-line recently.

"We only have one telephone line at the moment – 0492 49194 – but later this year it will be expanded", said Woodroffe.

"We have set up the first public interactive database in Wales with an on-line editor for user response.

"We're on-line 24 hours a day, standard 1200/75 board rate, and we welcome news and views, comments and opinions, on CymruTel – the database of Wales, for Wales and in Wales.

"But if I hadn't read that issue of *The Micro User* it never would have happened and 12 youngsters wouldn't have received their training as viewdata operators".

BUBBLE MEMORY FOR BBC

A NEW storage device from Tempatron for the BBC Micro plugs into the normal disc interface socket and stores data in a 1 mybte Fujitsu Bubble Memory.

The bubble memory is contained in a plug-in cartridge and each drive has two sockets allowing data to be transferred from one cartridge to the other.

Although the Fujitsu devices hold a potential 1 mbyte the cassettes actually have 250k of unformatted data capacity. The device allows two cartridges to simulate two separate single sided drives or one double sided drive.

Slower

Typical track access time is much slower than a normal floppy at around 150 ms, but the data transfer rate is 125k per second.

The unit operates from a single 5v power supply and is virtually the same size as a normal disc drive. LEDs on the front panel show the status of the unit and it has full protection against power supply interruption.

Tempatron claims mean time between failure is likely to be 400,000 hours.

Typing tutor on disc

A SPECIAL disc version of Vu-Type, the typing tutor from BBC Publications, has been published priced £18.40.

Also available is an enhanced version called Vu-Type Professional priced £21.95.

Existing owners of the tape version can obtain Vu-Type for £12.45 or Vu-Type Professional for £19.45 by sending a postal order or cheque plus their Vu-Type manual to BBC Publications. The manual will be returned with the disc.

Owners of the BBC's chess game White Knight Mk 11 can get White Knight Mk 12 at discount price by sending their manual plus £8.45 to BBC Publications.

UPDATE

THE integrated accounting system from Diamondsoft for the BBC Micro has been upgraded with new features including invoicing and statement production.

It comprises a number of modules which are integrated via a control module, including sales, purchase, nominal ledgers, cashbook and invoicing.

The system is supplied on 40 or 80 track disc, will operate with one or more drives and does not require a second processor.

Included in the package is a separate database system, used both for maintaining supplier/customer files and as an independent method of electronic filing.

Price is £27.50 a module and £150 for the complete system including ring binder, user manual, system disc and sample data disc.

THREE MAJOR NEW PRODUCTS TO BE LAUNCHED AT THE BBC MICRO USER SHOW.

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THE LOGICAL WAY TO BEAT THOSE BUGS

BUGS, the curse of the micro electronics industry, can mean having to spend hours searching through designs and programs to try and find faults.

Worse still, they can mean abandoned projects and serious loss of income, particularly for logic engineers who are designing new hardware or repairing systems.

Joe Atherton (left) and Malcolm Ray . . . built their own low cost logic analyser for the BBC Micro

Malcolm Ray and Joe Atherton, of Shootgrove, had their worst moment when they were working against deadlines to emulate a Winchester disc at one end of a Telecom line and a processor at the other.

They designed the hardware from scratch, with nothing much to go on, designed and built a prototype and tested it.

They overcame the expected minor faults, but somehow the system still wouldn't run.

Deadline

Three days double-checking the design revealed no obvious errors. They were no further forward and the deadline was coming up fast.

They knew what they needed – a versatile logic analyser which could look at both software and hardware. They even tried to get hold of one, but without success. So there was no choice but to spend desperate days and nights testing hunches and trusting to luck.

In the end they got lucky, but with a logic analyser much of the pain and the hassle could have been avoided.

So why couldn't they have a logic analyser? Mainly because these machines are so expensive, with top specialised models costing up to £30,000 and even the more basic types being priced over £3,500.

Shootgrove simply couldn't afford that. Not surprisingly, most of the other people who need logic analysers can't afford them either. And it is very difficult to beg or borrow one.

That episode was the last straw for Ray and Atherton. They decided to build a low-cost analyser to their own specifications.

The machine would be designed to be highly practical and straightforward to use, matching the power and facilities of the expensive imported machines, and with some useful extras as well.

That was the origin of Datatrace, a 40 mHz 16 channel logic analyser for the BBC Micro, which Ray and Atherton say they will launch onto the market this summer.

They expect it will be sold for less than £1,000, not because of any reduction in quality but because its design is based on a revolutionary switch of emphasis from hardware to software.

Previously, logic analysers have been substantial stand-alone modules in metal casings packed with special hardware and with hardware controls.

Datatrace minimises the specialised hardware, Ray and Atherton claim, and hands over much of the analysis and all of the control processes to a BBC Micro.

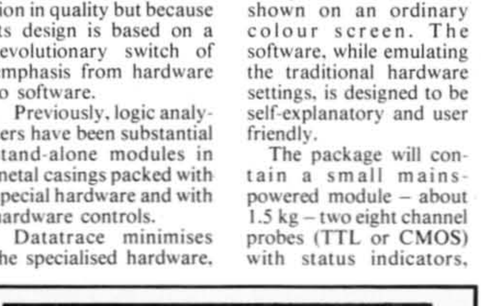
Both controls and analysis readouts are shown on an ordinary colour screen. The software, while emulating the traditional hardware settings, is designed to be self-explanatory and user friendly.

The package will contain a small mains-powered module – about 1.5 kg – two eight channel probes (TTL or CMOS) with status indicators, ROM chip for the BBC Micro and a manual.

Extra facilities will include an asynchronous clock running from DC up to 40 mHz and useable independently as a signal generator, 8 bit programmable pulse generator, 100 mHz frequency counter and auxiliary power supply.

Ray and Atherton expect it will have applications in software and hardware debugging at all levels, testing and repair of microelectronic systems, computer education and research.

Sports quiz


ANSWER BACK
SPORT
A SPORTS GAME WITH A DIFFERENCE FOR ALL AGES
BBC(32K) ELECTRON
398

THE third in the Kosmos Software series of Answer Back quiz programs for the BBC Micro has been released.

Answer Back Sport combines two machine code sports games with a series of quizzes on sporting subjects. The games can be run separately or in conjunction with the quizzes. Either way the objective is to beat the Kosmos team.

A master control program is first loaded into the micro.

A total of 26 quizzes are supplied on the cassette, each covering a different activity from athletics to water sports.

As with the other titles in the series, Answer Back Sport includes all the facilities to enable an unlimited number of new, multiple choice quizzes to be created, edited and saved. Price is £9.95.

New line for Dream

BEST known for its debugging monitor utilities for the BBC Micro, Tomorrows Dream Software has released its first arcade style game, Sub Strike, for the machine.

The program involves a battle between a submarine and a horde of attacking helicopters armed with bombs and depth charges.

Sub Strike is written in machine code with full colour Mode 2 graphics

There is free choice of control keys and a joystick option, with a high score table to keep track of performance. Price is £6.50 for cassette, £8.50 on disc.

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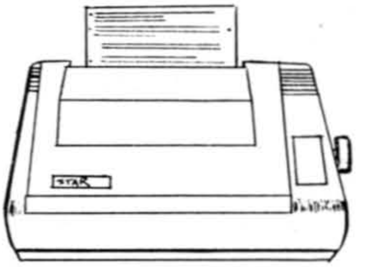

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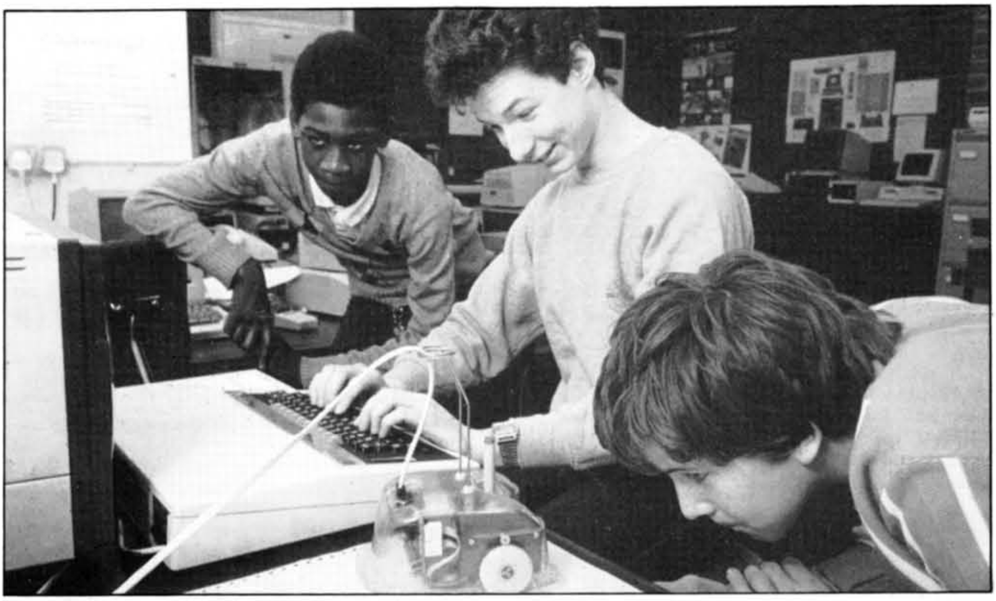


A turtle for Logotron

SAID to be the first time a turtle-type robot has been marketed alongside Logo software, IGR's Zero 2 has been released bundled with Logotron for the BBC Micro, priced £149.95.

The robot, sold in kit form for £79.95 and assembled for £99.95, will initially be used for education and games – but during the next few months will be developed to perform simple useful tasks as well as becoming the basis for a sophisticated robotic games playing system, says IGR.

Zero 2 is a small robotic device equipped with wheels, pen, lights, line follower and two-tone horn, controlled by electronic signals through a cable from the computer.

It is capable of precision movement in forward, backward or turning motions to accuracies of 1.0 mm or one degree, enabling programs to be written to instruct the turtle to draw a trail of complex shapes accurately, says IGR.

It can be equipped with a bump sensor, so the computer program is informed when the robot has met an obstacle and can issue commands to avoid the obstruction.

Developments under way will give Zero 2 many more abilities. It has an on-board expansion connector which will allow up to two other printed circuit boards to be plugged in, eventually giving capabilities like speech synthesis.

A two way infra-red link will also be available that will do away with the need for an umbilical connection to the micro.

Primary Logo

A COMPLETE schools and home Logo package for the BBC Micro has been launched by Honeyfold Software.

Part of the package consists of a set of classroom lessons presented in a format designed for the primary school.

They are supplemented by a set of work cards which integrates with the text.

A companion guide explains the major teaching points of each lesson and assists the teacher in putting over its content.

A further approach for the parent and teacher is provided by "A Guide to Logo for Parents and Teachers" which reflects the needs of the older reader.

HoneyLogo on tape or disc with the guide for parents and teachers costs £16.

ACCENT ON EDUCATION . . .

Simulating simulations

LEARNING and entertainment are combined in six new educational programs for the BBC Micro from Jacaranda Wiley Software aimed at youngsters aged seven to 13.

Gold Dust Island is an adventure simulation program, designed to encourage cooperative behaviour and strategic planning, in which players have to survive after being shipwrecked on a desert island. Price is £19.95.

Quick Cartage Company is a computer simulation in which students practice the basic map reading skill of measuring distance on maps of two different scales. Price £19.95.

Raft Away River is an adventure simulation game designed to encourage the social skills of effective communication, co-operative behaviour and problem solving as a group. It also stimulates reading, comprehension and the interpretation of pictorial information. Price £19.95.

In Scavenger Hunt each player must find five objects located somewhere on the screen display, negotiating obstacles and practising basic map reading skills. Price £14.95.

Cunning Running is a computer simulation of the popular sport of orienteering, with players practising basic map reading skills and using alphanumeric grid references. Price £14.95.

Alphanumeric grid references also feature in Sheep Dog trial in which each player controls a dog which must separate a number of sheep from the flock and herd them into a pen. Price £14.95.

O Level aids

HELP for youngsters taking O Levels is promised by a series of courseware programs for the BBC Micro to be released soon by College Software.

The age range of the programs is 10 to 17 and subjects include English, maths, physics, chemistry and geography.

The packages which include music, sound, full colour graphics and fast loading on cassette are available on cassette and disc.

Atari approved action

A NEW level of sophistication in arcade action gaming for the BBC Micro has been achieved by Superior Software with its version of the Atari classic Tempest.

The product is the result of a recent softening of Atari's former hardline policy toward software houses wishing to adapt its arcade games for micros.

Sensible

As one industry observer recently wrote: "There are signs of much more sensible mutual cooperation between Atari and the hard pressed software publishers".

An early beneficiary has been Superior Software, whose BBC Micro version of Tempest carries the "Atari Approved" stamp on its packaging.

They have used all the latest techniques to make the game as similar to the original arcade version as possible – imitating closely the highly polished graphics and sound effects.

Authorise

"Atari would only authorise this version of Tempest if it reached a high enough level of sophistication" Superior managing director Richard Hanson told *Micro User*.

"Now that we have achieved this level of performance I'm hoping that Tempest will be the first of many Atari arcade games available for the BBC Micro".

Double function

OLIVETTI has brought out a portable electronic typewriter that doubles as a home computer printer or keyboard.

The ET compact 60 offers a range of typing and editing facilities for home or office use.

Serial RS232 and parallel Centronics interfaces are offered as options and the suggested selling price is around £375.

Primary packs maths

SCHOOL radio series "Maths with a Story" has been augmented by two software packs for the BBC Micro designed for home users as well as teachers.

Aimed at the primary age group, the programs are by former maths teacher Peter Smith and have been given extensive trials in schools.

The software, from BBC Publications, is being published in two cassette packs costing £10.95 each, the first available now and the second to be launched in September.

Re-packaged

The first pack contains four programs – Coordinate Jigsaw, Symmetry Patterns, Two Dice Race Game and Colouring Puzzle.

The two teacher books by maths consultant Shirley Stewart which accompany the radio broadcasts are being combined, edited and repackaged and will be available as an optional extra to the software.

The second series is being repeated this summer and autumn.

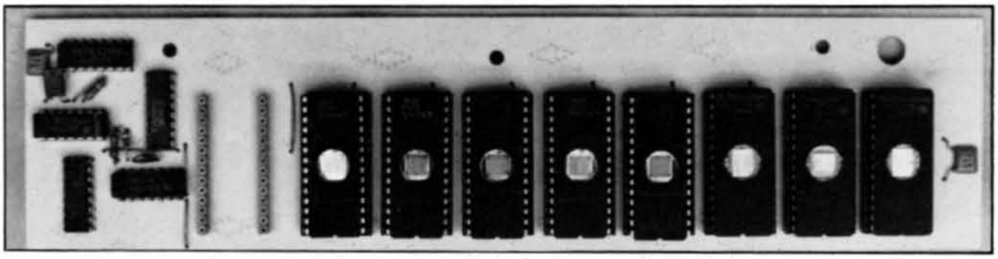
WRIST MICRO

A COMPUTERISED wrist watch and terminal for use with the BBC Micro is being developed by Seiko.

As well as acting as a sophisticated timepiece it will allow the wearer to set an alarm up to one year in advance and store up to 80 pages of data for recall.

A version of the Seiko RC1000 is expected to appear on the market this spring as soon as operating software has been developed for use in conjunction with four non-Acorn micros.

Software for the BBC Micro will follow later, says Seiko, which is already marketing a watch which couples with a miniature alphanumeric keyboard to calculate and store data.



Expanding sideways

A COMPACT 246 × 60 mm card from J.P. Designs allows eight 28 pin ROMs to be used in the sideways ROM area of the BBC Micro.

Eprom types 2764 and 27128 can be used, allowing up to 128k of extension.

Connection is by two connectors which require no soldering. All bus signals are taken from one of the existing sideways ROM sockets.

The card is mechanically secured by three support pillars which provide a stable extension and places no strain on the BBC ROM socket.

The remaining ROM sockets can still be used with the extension card fitted. Price is £24.95.

Drive to slash cost of maintenance

WHEN James Doyle and David Silverman started their computerised bookkeeping service for small businesses they bought a BBC Micro and Z80 second processor.

But when they shopped around for maintenance and repair cover for their shiny new equipment they were shocked by the terms and conditions on offer.

"Ridiculous and financially intolerable" is how the pair describe the service contracts they looked at.

As a result they are organising an Acorn Business Users Group to try and force down the cost of coverage to a more reasonable level.

Doyle and Silverman, partners in Park Computer Services, found that if they went for the cheapest deals they would have to cease operations while their equipment was being repaired.

On the other hand, those contracts that provided a temporary replacement machine were so expensive it made more sense to dump faulty equipment and buy new.

Doyle told *The Micro User:* "We were quoted £400 a year for maintenance of £2,000 worth of equipment. Insurance prices were even sillier.

Replacement

"We did find one firm offering maintenance cover for £200 – but they wanted another £200 to provide a replacement machine while ours was being serviced.

"However we understand a large enough user group could negotiate maintenance cover, including replacement equipment, for about £200 a year.

"As soon as enough Acorn computer owners come forward – and they needn't be business people – we shall hold a meeting in London to draw up our plans.

"Our further aims include bulk buying of software and peripherals at reduced prices and an information service to replace the recently closed Acorn customer services department".

Courses are a holiday

MILLFIELD, the famous independent school, has chosen BBC Micros for its computer courses for beginners during its 1985 season of activity holidays.

From July 29 to August 23 the school, near historic Glastonbury in Somerset, opens its doors to youngsters, adults – even pensioners – offering 83 activities from archaeology to yoga.

The holiday computer courses are for young and old beginners to learn the basics of computer programming. Every learner gets exclusive use of a BBC Micro and classes are kept small, averaging 12 people to one tutor.

Absolute beginners come because they want to set off on the right footing, said course tutor Peter Fry, who is also head of Millfield's computer department.

Hobbyists at an intermediate level join in because they want to pick up new ideas and develop experience on graphics, files, data processing and so on.

A lot of parents attend because they feel the need to keep up with their children. Others on the course may be doctors, teachers and business people who require a knowledge of computers in their workplace.

The general aim is to offer a serious introduction to computers, with worthwhile instruction and experience, but in the atmosphere of a holiday centre.

Computer course members can therefore combine their studies with any of the other sport and craft activities available.

Easier essays

TWO secondary level English language programs from Summer 76 Software are designed to lay a useful foundation for essay writing and provide an introduction to literary appreciation.

The Lively Sentence and Sentence Linking by noted textbook author Alfred Hossack have previously only been available to schools. Summer is now releasing them to the general public priced £14.95 each.

BET YOU £1 YOU CAN'T CRACK IT.

CASTLE QUEST
BY MICRO POWER

Can you meet the challenge of Castle Quest, the absorbing new game for the BBC Micro featuring Micro Power's revolutionary M.P.4 Scrollerama system? A game that's so difficult, we're prepared to bet you a pound, that even employing lightning reactions and sound logic you still can't crack it within three full months.

You can make a start at winning the wager by buying Castle Quest on cassette or disk now. It's available from all leading Micro Power stockists.

And good luck.
You'll need it.

Probably the most challenging game ever devised for the BBC Micro.

CASTLE QUEST
BY MICRO POWER
0532-434006

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DISKING NEWS

THE DISKING PROMISE. If you don't find us the slickest diskette supplier, we want to know. We're here to serve you, and if you're not happy, we're not! We strive to keep everything you see here IN STOCK and normally ship within four hours (YES HOURS!) A full refund if dissatisfied, goes without saying.

NEW FROM DISKING. Brighten up your office, order your own SUPERB Coloured diskettes NOW! Choose from RED, ORANGE, YELLOW, GREEN, PALE BLUE and BLUE. They come in fives of one colour, with a FREE SEE 10 Library Box and Colour Coders thrown in. **GET SOME – They're GREAT!**

THE DISKING KC (Kind Company) AWARD. This month we are pleased to congratulate the girls at ALEXON, a lady's fashion shop in the High Street, Guildford. My wife likes these clothes, and we also like the fact that they're British! Anyway, there I sat, nodding in approval or otherwise at items being tried on, when an idea struck me on how I could escape. I'd mention coffee, and then disappear to the coffee shop, via the hi-fi and camera shop of course. Overhearing me, we were asked if we would like a cup, and being a coffee snob (not liking instant) I asked if it was real. It was, and we had it beautifully served in nice cups and saucers. Furthermore, one girl even ran across the road to A&N's to get a jacket that my wife wanted. AND they have just telephoned us to say that a blouse we ordered, is now in, only **1 working day** after we ordered it!! I've no doubt that we will return to this shop, as I enjoy doing business with people who CARE – **HOW REFRESHING!**

P.S. It's a pity they couldn't trade with the front door closed – my feet were frozen.

DISKETTES

Maxell — The Gold Standard

maxell.
MD1-D

5¼" Diskettes

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
MD1-D S/S 48 tpi	23.90	22.90	21.90
MD2-D D/S 48 tpi	34.90	33.90	32.90
MD1-DD S/S 96 tpi	34.90	33.90	32.90
MD2-DD D/S 96 tpi	42.90	41.90	40.90

Certified for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.

8" Diskettes

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
FD1-XD S/S D/Dens	32.90	31.90	30.90
FD2-XD D/S D/Dens	40.90	39.90	38.90

32 hard sector available at the same prices.

3½" Microdisks

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
MF2-DD D/Sided 1.0Mb	59.90	58.90	57.90

3" Microdisks

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
CF2 Compact D/S Floppy	39.90	38.90	37.90

Dysan for the Discerning

5¼" Diskettes

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
104/1D S/S 48 tpi	23.90	22.90	21.90
104/2D D/S 48 tpi	34.90	33.90	32.90
204/1D S/S 96 tpi	34.90	33.90	32.90
204/2D D/S 96 tpi	42.90	41.90	40.90

Certified for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.

8" Diskettes

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
3740/1D S/S D/Dens	32.90	31.90	30.90
3740/2D D/S D/Dens	40.90	39.90	38.90

32 hard sector available at the same prices

MEMOREX
Memory Excellence

5¼" Diskettes

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
3481 S/S 48 tpi	22.90	21.90	20.90
3491 D/S 48 tpi	29.90	28.90	27.90
3504 S/S 96 tpi	28.90	27.90	26.90
3501 D/S 96 tpi	36.90	35.90	34.90

Certified for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.

5¼" Diskettes (HIGH DENSITY)

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
5500 D/S 1.6 MByte	49.90	48.90	47.90

3½" Microdisks

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
6100 S/Sided 0.5Mb	42.90	41.90	40.90

coloured diskettes

5¼" Supplied in *Five-Packs* of one colour

*Prices and quantities relate to **Five-Packs***

Prices exc VAT	1-9	10-19	20+
1D S/S 48 tpi	12.90	11.90	10.90
2D D/S 48 tpi	18.90	17.90	16.90
1DD S/S tpi	18.90	17.90	16.90
2DD D/S 96 tpi	21.90	20.90	19.90

To order the colour of your choice, just precede the type number with the appropriate letter, (R) RED, (O) ORANGE, (Y) YELLOW, (G) GREEN, (B) BLUE & (P) PALE BLUE. For the actual colours, please see our full colour advertisement back a couple of pages, or call and ask for our full colour brochure.

DataLife
Verbatim

Verbatim Datalife = Best!

5¼" Diskettes

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
MD 525-01 S/S 48 tpi	22.90	21.90	20.90
MD 550-01 D/S 48 tpi	29.90	28.90	27.90
MD 577-01 S/S 96 tpi	28.90	27.90	26.90
MD 557-01 D/S 96 tpi	36.90	35.90	34.90

Certified for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.

8" Diskettes

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
FD 34-9000 S/S S/D	31.90	30.90	29.90
FD 34-8000 S/S D/D	31.90	30.90	29.90
DD34-4001 D/S D/D	36.90	35.90	34.90

32 Hard Sector available at same price.

3½" Microdisks

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
MF350 S/Sided 0.5Mb	42.90	41.90	40.90

Verbatim Verex = Value

5¼" Diskettes

*Prices and quantities relate to **Ten-Packs***

Prices exc VAT	1-4	5-9	10+
MD200-01 S/S 48 tpi	19.90	18.90	17.90
MD250-01 D/S 48 tpi	23.90	22.90	21.90

48 tpi suitable for 35 or 40 track operation.

8" Diskettes

*Prices and quantities relate to **Ten-Packs***

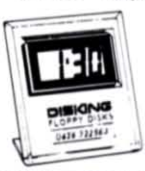
Prices exc VAT	1-4	5-9	10+
FD34-1500 S/S S/D	22.90	21.90	20.90
DD34-1501 D/S D/D	29.90	28.90	27.90

32 Hard Sector available at same price.

FREE!

worth 8·95

LCD TABLE CLOCK



with EVERY 20 Diskettes ordered at these prices

When you buy twenty diskettes (any size, make or type) at these prices, you will receive, completely FREE of charge, this superb calendar clock with a large easy to read 24mm LCD display. Buy forty diskettes and you will receive two clocks and so on.

Offer ends 30th April, 1985

PLUS

FREE with every Ten-pack of diskettes from DISKING (or Five-Packs if coloured disks). The Superb SEE 10 Library Box. Also available individually for £2.50 exc VAT, either for 5¼" Disks (SEE 10), or 3½" Disks (SEE 10-3). Now also available for 8" Disks (SEE 10-8) at £3.00 exc VAT.

PLUS

FREE DISKING Colour Coders
A multicoloured pack of ten fibre tipped pens for colour coding your diskette labels. Available individually at 49p exc VAT.

BARGAIN CORNER

Bargain Corner Diskettes 5¼" Diskettes

Complete with a FREE SEE 10 library box and Colour coders, these disks are certified and are from one of the manufacturers in this ad.

*Prices and quantities relate to **Ten-Packs***

Exc VAT (No hub ring)	1-4	5-9	10+
UL1D S/S 48 tpi	13.90	12.90	11.90
UL2D D/S 48 tpi	20.90	19.90	18.90
UL1DD S/S 96 tpi	20.90	19.90	18.90
UL2DD D/S 96 tpi	24.90	23.90	22.90

Suitable for single OR double density.

Exc VAT (With hub ring)	1-4	5-9	10+
UL1DHR S/S 48 tpi	14.90	13.90	12.90
UL2DHR D/R 48 tpi	21.90	20.90	19.90
UL1DDHR S/S 96 tpi	21.90	20.90	19.90
UL2DDHR D/S 96 tpi	25.90	24.90	23.90

Suitable for single OR double density. 48 tpi suitable for 35 or 40 track operation. 96 tpi suitable for 77 or 80 track operation.

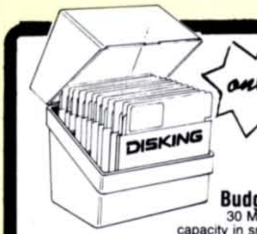
Coming Soon Flip 'n' File Diskette Storage

DISKETTE STORAGE

See next month's issue — Flip 'n' File The Diskette Storage

BUDGET RANGE

Buy 3 of a kind and get the 4th one FREE



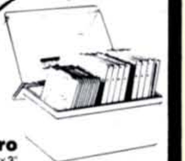
only 5·90

Budget 30

30 Minidisk capacity in smart beige brown complete with five coloured dividers.

Part No	Description	Price exc VAT
B30	30 Minidisk capacity	5.90

If buying 3 to get one FREE p&p @ 4 unit rate please



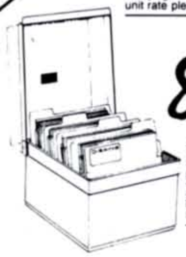
Budget Micro

30 Microdisk capacity (or 12×3" disks). Smart two-tone beige brown.

Part No	Description	Price exc VAT
BM	30 Microdisk capacity	6.90

If buying 3 to get one FREE, p&p @ 4 unit rate please.

6·90



8·90 Great Value!

Budget 50

50 Minidisk capacity in smart two-tone brown, complete with four dividers and non-scratch rubber feet.

Part No	Description	Price exc VAT
B50	50 Minidisk capacity	8.90

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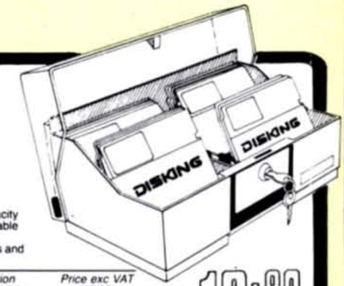
POPULAR



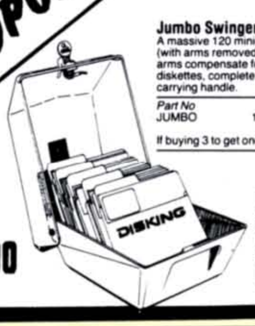
Jumbo Swinger

A massive 120 minidisk capacity (with arms removed). Adjustable arms compensate for less diskettes, complete with keys and carrying handle.

Part No	Description	Price exc VAT
JUMBO	100+ Minidisk capacity	18.90

If buying 3 to get one FREE, p&p @ unit rate please.

18·90



17·90

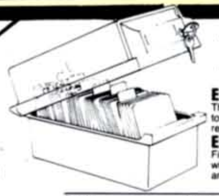
Disking Swing-Lid Lockable Box

60 Minidisk capacity, complete with keys, dividers, tags and even built in carrying handles.

Part No	Description	Price exc VAT
DSLB	60 Minidisk capacity	17.90

If buying 3 to get one FREE, p&p @ 4 unit rate please.

EXECUTIVE



19·90

Executive Range

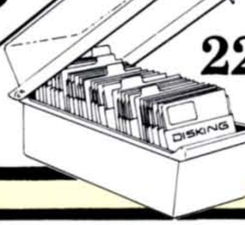
The ultimate in quality. Luxurious two-tone brown, with dividers, tabs, keys, removable lids — you name it!

Executive Micro 50

Fifty 3.5" microdisk capacity complete with removable lid, dividers, tabs, lock and 2 keys.

Part No	Description	Price exc VAT
EM50	50 microdisk capacity	19.90

If buying 3 to get one FREE, p&p @ 4 unit rate please.



22·90

Executive Mini 100

100 5.25" minidisk capacity complete with removable lid, dividers, tabs, lock and 2 keys.

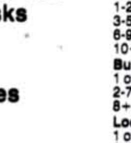
Part No	Description	Price exc VAT
EM100	100 minidisk capacity	22.90

If buying 3 to get one FREE, p&p @ 4 unit rate please.

DISKING supermailers

These diskette mailers come packed in 100s and are of a very clever copyright design. They well hold up to 4 diskettes complete with envelopes and are extremely robust.

Part No	Description	Price exc VAT
DSM 100	Supermailers	24.90



NEW

Memorex Cleaning Kits

The latest computer care range from Memorex represent fantastic value for money, and are available individually or with a discount if purchasing all three.

Buy all three kits together, and we will reduce the total price from £18.70 to £14.90 SAVING £3.80 — A BARGAIN IF EVER WE SAW ONE!

MEMOREX
MEMOREX
MEMOREX
COMPUTER CARE

Part No	Description	Price
MKEY	Case/keyboard cleaning kit	4.90
MTV	VDU screen cleaning kit	4.90
MDD	Disk drive head cleaning kit	8.90

Coming Soon 3½" Cleaning Kits

Postage and Packing Rates

UK Shipping Rates exc VAT

5¼" Disks or microdisks
1-2 packs each pack @ 95p
3-5 packs each pack @ 75p
6-9 pack each pack @ 60p
10+ packs POST FREE

5¼" Coloured Diskettes
1-3 5-packs 50p each pack
4-9 5-packs 30p each pack
10+ 5-packs POST FREE

8" Diskettes
1-2 packs each pack @ 1.60
3-5 packs each pack @ 1.20
6-9 packs each pack @ 90p
10+ packs POST FREE

Budget Storage
1 off £1.00 each
2-7 off 70p each
8+ off POST FREE

Lockable Storage
1 off £2.00 each
2-7 off £1.30 each
8+ off POST FREE

All 'SEE 10' Library Boxes
1-4 off @ 40p each
5-9 off @ 30p each
10+ off @ 20p each

Disking Diskwriters
50-pack £1.00

Disking Colour Coders
1-5 packs 25p per pack
6+ packs POST FREE

Disking Supermailers
100-pack £3.00

Memorex Cleaning Kits
1 off 60p each
2-7 off 40p each
8+ POST FREE

TRADE CORNER

FREE Aeroplane

Our latest aeroplanes have sound, so you'll have no trouble waking up those sleepy software engineers, when you throw it at them. Just call and ask for our flier, and we'll send you our latest trade pack with prices, special offers and sample unlabelled diskette. We'll also enclose a DPC (Disking Priority Customer Card) application form telling you how to buy at our 10,000 prices yet order in 50's.

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If in doubt at ANY time, just call and ask for Joan. She will answer any questions that you may have, even if you only want a catalogue and order form, just CALL!

Official Government Orders Welcome

We supply all Government bodies including schools, Universities, Colleges, Hospitals, the Utilities, Research Establishments, Armed Forces, the Ministries and Local Authorities world-wide. We will despatch within 4 (YES, FOUR) working hours from receipt of your official order number received either by post or by telephone and all orders are handled in the strictest confidence and to the letter. All other customers, cheque with order please payable to DISKING. If you are a large establishment and cannot raise cheques without an invoice, please post or telephone your order, and we will send a pro-forma invoice by return for your accounts department to pay against.

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FREE DISKING logobug for all orders left on the answering machine. You may call 365 days a year, 24 hours a day, and you may speak for as long as you like when you leave the following details:

1. Day-time telephone number
2. Cardholder name and address
3. Delivery (or invoice address) if different
4. Your Credit Card Number
5. What you want and how many
6. Normal or first class post

We welcome Access (Mastercharge) Barclaycard (VISA) and Diners Club International, and there is NO credit card surcharge. Alternatively you may write your credit card number on your order.

Leave the REST to US!

Urgent Orders

If you are posting your order, leave out the word FREEPOST from our address, and use our normal post code GU30 7EJ and do not forget to stamp it First Class. If you are telephoning your order, please make it clear that your wish to pay for your goods to be sent to you by First Class Post.

First Class Rates

Minidisks & Microdisks:
First Ten-Pack, £2.00. Second and subsequent Ten-Pack, £1.50.

Very Urgent Orders

If ordering by telephone, and by 3.00pm you may request Datapost which delivers the next morning at 9.00am. Minimum cost is £10.00 for the first 5kg — please call.

Desperate Orders

Just call and ask for Joan or Roger and we will do whatever we can to help you with your problem. If you are not too far we can probably organise a taxi or courier.

p&h electronics Ltd

5 THE PARADE · YATELEY
TEL: YATELEY 877222

22/24 GUILDFORD ROAD · BAGSHOT
TEL: BAGSHOT 73078

BBC MICRO CENTRES

TELEPHONE OR VISIT

ALL PRICES INCLUDE VAT
PRICES ARE SUBJECT TO CHANGE WITHOUT NOTICE

FAST PHONE/MAIL SERVICE – SAME DAY DESPATCH ON ITEMS IN STOCK

SUPPLIERS TO SCIENTIFIC AND EDUCATION AUTHORITIES

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Electron + 5 Games	**£119.00**	Amstrad CPC464 Colour + 12 Programs	£ 349.00
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BBC B + DFS	£ 469.00	Sanyo MSX	£ 275.00
Sinclair Spectrum + 6 Games	**£129.00**	Sony Hit Bit + 3 Programs	£ 290.00
Sinclair QL + Business Software	£ 389.00	Apricot Fle System	£1025.00
Amstrad CPC464 Mono + 12 Programs	£ 239.00	Apricot FI System	£1255.00

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BBC User Guide Binder	£ 3.95
Advanced User Guide BBC	£12.95
Advanced user Guide Binder	£ 3.95
Advanced Basic Rom BBC	£ 7.95
Advanced Graphics for BBC	£ 9.95
Advanced Machine Code on BBC	£ 7.95
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BBC Disc Companion	£ 7.95
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Exploring Music (BBC Electron)	£ 9.95
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Printer Driver Generator Cassette	£ 9.95
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Hi-View (for 2nd 6502)	£58.00
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ACCESSORIES

Quality Digital Recorder	£ 29.95
Quickshot II Joystick with BBC Interface	**£19.95**
Full Proportional return to centre Joystick	**£12.95**
Full Proportional Joysticks Pair	£ 20.00
Soft Dust Cover 'B' and Electron	£ 5.00
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Printer Cover (State Type)	£ 5.00
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Single Computer Desk Metal Frame	£ 59.95
Double Computer Desk Metal Frame	£ 69.95
Mains Distribution Block with Plugs	£ 7.50
Sideways Rom Board	£ 45.00
Disk Storage Box (50)	£ 18.00
Disk Storage Box (85)	£ 23.00
Data Modem	£199.00
TV Aerial/Computer Switch	£ 2.50
BB Key Function Key Mask	**£2.00**
Flow Chart Template	£ 1.50
BBC Giant Reference Card	£ 2.50
Cassette Lead	£ 3.95
AMX Mouse and Software	**£85.00**
EMI Tracker Ball and Software	**£55.00**

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Ferguson MM02 High Res Mono Green 12"	£ 85.00
Ferguson MM06 High Res Mono Amber 121"	**£85.00**
Sanyo DM8112 High Res Mono Green 12"	£115.00
Microvitec 1431 Std Res Colour 14"	**£199.00**
Microvitec 1451 Med Res Colour 14"	£290.00
Microvitec 1441 High Res Colour 14"	£485.00
Microvitec 1451 Q3/QL Black Med Res 14"	£280.00
Sanyo 3125 Std Res Colour 14"	**£199.00**
Ferguson MC01 14" CTV + RGB Monitor	£215.00
Saba 37541 14" CTV + RGB Monitor	£215.00
Hitachi 1444 14" CTV + RGB Monitor	£199.00
Hitachi 1446 As above remote control	£230.00

PRINTERS

Epson RX80T	£240.00
Epson RX80FT Plus	£270.00
Epson FX80	£400.00
Epson P40	**£90.00**
Epson JX80 Colour Printer 160cps	**£600.00**
Epson 2K Serial Interface	£ 25.00
Cannon PW1080A	£340.00
Tally MT80 Plus 100cps	**£215.00**
Smith Corona Fastext 80	**£199.00**
Brother HR15 Daisy Wheel	**£415.00**
Silver Reed EX500 D/wheel	£320.00
Silver Reed EX43 D/wheel with Keyboard and Interface	£399.00
Juki 2200 D/wheel	£299.00
Juki 6100 D/wheel	£385.00
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Disk Doctor	Rom	£29.00
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CSX100 100K S/S 40T no p.s.	**£120.00**
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CS200/D 200K D/S 40T with p.s.	**£165.00**
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I enclose cheque/PO for ______ P&P see above ______

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CARRIAGE COSTS – Micros – Monitors – Disc Drives – Printers – Desks – 2nd Processors: £7

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Price includes FREE 5 games software packages

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(extra 32K RAM Card already fitted)

Only: **£359**

BBC B with Watford DFS	£342
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Complete BBC B ECONET Networking System now available.

(P.S. ROM based software purchased with any of the above Micros will be fitted free of charge).

6502 Acorn 2nd Processor	£175
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TORCH Z80 Card + Software	£275
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Acorn Bitstick	£325
Acorn IEEE Interface Complete	£280
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Dust Cover for BBC Micro

Protects your expensive Micro from foreign bodies while not in use. **£3.50**

PRINTERS

● EPSON RX80 Printer	£209
● EPSON RX80 F/T Printer	£219
● EPSON FX80 Printer	£316
● EPSON FX 100 Printer	£429
● Centronics PRINTER CABLE for all the above printers to interface with the BBC Micro.	£7

(Securicor carriage charge on printers £7)

RX & FX PRINTER INTERFACES

Epson interfaces fit inside the printer to allow connection using techniques other than Centronics.

RS232	£25	RS232 + 2K Buffer	£55
IEEE 488	£62		

JX-80 FULL COLOUR PRINTER

The new Epson JX-80 DOT MATRIX COLOUR printer is fully compatible with the popular FX-80. Using a four colour ribbon, printing can be in 7 colours with speeds of up to 160 CPS. It is capable of 80 characters per line or 137 in condensed mode. Its resolution is selectable from 480 to 1920 dots per line. The printer has a friction and fully adjustable tractor feed mechanisms as standard.

Introductory offer **£525**

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Type	Ribbons	Dust Covers
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GP80	£4.50	–
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GP250	£5.95	£3.95
KAGA KP810	£5.95	£4.75
CANON PW1080	£5.95	£4.75
MICROVITEC MONITORS	–	£5.50

4 COLOUR PLOTTER PRINTER

SAKATA SCP-800 printer/plotter facilitates plotting & printing in 4 colours on paper upto A4 size, using easily replaced pens. In text mode it prints upto 12 CPS. Max 160 Char. per line. In graphics mode it offers full plotting facilities incl. drawing, moving, scaling of text, rotation & drawing of axes. (Write for a sample printout).

Only £175

Set of 4 SPARE PENS only **£3.95**

PRINTER SHARER

Allows 3 BBC Micros to be connected to one Printer.

Only: £65

BROTHER HR-15 DAISY-WHEEL PRINTER

Brother HR15 is a high-quality daisy-wheel ideal for a budget printer for serious use. Notable features of this printer include a 3k buffer, 18cps (max), bi-directional printing, proportional spacing, Centronics or RS232 interfaces as standard, optional sheet feeder and an optional keyboard.

With immediate effect, we are offering at no extra cost ON-SITE 12 months Maintenance on all HR15 Printers purchased from WATFORD on or after March 1985.
W.E. GIVES YOU A GREAT DEAL

ONLY **£325** (carr. £7)

Single Sheet Feeder	£195
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RIBBON CARTRIDGES:
Fabric **£3.75**; Carbon **£3.75**; Multistrike **£6**

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1,000 Sheets 9½" Fanfold Paper	£7
2,000 Sheets 9½" Fanfold Paper	£13
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Carriage on 1,000 Sheets £1.50

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1,000 90×36mm	£5.00
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1,000 102×36mm	£6.25

Carriage on 1,000 Labels £1.00

All prices exclude VAT

SPECIAL OFFER

HITACHI EPROMs for Sideways ROMs
2764-250nS £4.25
27128-250nS £9.75

RAMs (Low power) for ATPL, WATFORD, etc., Sideways ROM Boards
6116LP (2K) £3.25
6264LP (8K) £9.95

(Maximum of 5 ROMs or RAMs of any one type per order). Dealers inquiry welcome.

KAGA KP810 NLQ PRINTER

This new Japanese printer has EPSON FX/RX compatible control codes and is functionally equivalent to an FX80 with the added advantage of its 'Near Letter Quality' mode. It is solidly built and features include: Normal, Italic, Enlarged, super/subscript, proportional spacing and user-defined character set. Extras over the FX80 included in the price are Near Letter Quality (NLQ) print ideal for correspondence, Proper adjustable tractor feed, half speed quiet mode and 3K buffer. The printer is bi-directional and logic seeking to give a speed of 140CPS for high throughput in conjunction with the standard 3K buffer. 8K RAM may be added to give more user-defined character sets. Centronics parallel interface + Watford's 12 month NO QUIBBLE WARRANTY.

Special Offer: ONLY **£252** (£7 carr.)

RS232 interface + 2K buffer to connect to other micros. **£89**

EPSON HI-80 PLOTTER

The latest addition to the popular range of EPSON Printers/Plotters. Prints in upto 10 colours. Has many more features. Please write in for spec sheet.

Price: Only **£399** (£7 carr.)

KAGA KP910 Printer

Similar to the KP810 but with 17" carriage for wide print. Gives 156 columns of normal print or 256 columns in condensed mode. Ideal for printing out spreadsheets.

ONLY **£339** (£7 carr.)

PRINTER LEAD

Centronics lead to connect BBC micro to EPSON, KAGA, SEIKOSHA, NEC, STAR, JUKI, BROTHER, SHINWA etc. printers.

Standard length (4 feet long)	£7
Extra long (6 feet long)	£9

Continued →

THE ULTIMATE DFSs for the BBC MICRO

Watford are proud to be able to supply both SINGLE and DOUBLE DENSITY versions of their highly acclaimed Acorn compatible DISC FILING SYSTEM.

THE FEATURES OF WATFORD'S SINGLE & DOUBLE DENSITY DFS.

- The system allows standard Acorn's 31 files or 62 files per disc side.
- Built-in formatting program.
- Built-in Disc VERIFIER.
- Built-in SECTOR EDITOR.
- Double step mode allows use of 40 or 80 track Discs on 80 track drives. (software switchable).
- A WORKFILE function allows a program to be edited and repeatedly saved having only typed its name once.
- Allows use of AMBIGUOUS filenames.
- Two commands exist to allow transfer of programs from tape to disc.
- An Advanced COPY COMMAND is included.
- RENAME has been extended to allow the use of ambiguous filenames.
- An improved OPENOUT command.
- A SPACE command informs you of the space left on the disc.
- 2K of RAM can be reclaimed from the DFS by setting "PAGE" to &1100.
- The *CAT command automatically utilises the full width of an 80 column screen where available.
- FULLY COMPATIBLE WITH TELETEXT, TORCH and both ACORN 2nd PROCESSORS.
- Disc prepared on ACORN DFS can be both read & written to on WATFORD's DFS & vice versa.

Please write-in for further detail technical specifications.

What do the independent press say?

"Good value for money" – Beebug
"A very worthwhile package" – The Micro User
"You'll be buying a very powerful package" – Personal Computer News
"Superior DFS: Excellent disc sector editor" – Computer Answers

Without a doubt the most sophisticated DFS software yet written for the BBC microcomputer. This powerful DFS is fully compatible with the ACORN DFS, yet has much increased power due to the additions, carefully designed to make life easier in normal use. It consists of 16K of efficiently written machine code. It is entirely self contained and so does not require a utilities disc to function.

SINGLE DENSITY INTERFACE PRICES

● DFS (Disc Filing System) ROM	**£18**
● Complete Disc Interface Kit Incl. DFS ROM & fitting instructions	**£89**
● Acorn's DFS Kit complete	**£86**
● DFS Manual (comprehensive)	**£6.95**

(Our DFS Manual is suitable for both versions of Watford's DFSs and the Acorn DFS)

- We will exchange your existing Acorn DFS for Watford's ULTIMATE DFS for **£14**

Please note that this is FULLY Acorn DFS compatible and runs, without exception, all products tested, including Elite".

Watford's DFS is exclusively available from Watford Electronics. We DO NOT retail this product through dealers. Every ROM carries a printed label with our LOGO and a serial number.

Access

ACCESS HOT LINE (0923 50234)

24 Hours

WATFORD'S ULTIMATE DOUBLE DENSITY DFS

SIMPLE but SOPHISTICATED

We are proud to bring to you the Watford Electronics Double Density Board for the BBC Micro.
The DDFS supplied is a new version of the popular Watford Electronics DFS re-written to make full use of the capabilities of the new double density controller.
We are proud to announce that our double density now runs all known versions of Acornsoft's best-selling game Elite. DDFS also runs Hi-View, Fortress, Aviator, Castle Quest, etc.

- Increases storage capacity of your Disc Drives by the maximum physically possible, **80% !!!**
- Our system will use the whole of an 80 track drive. Inferior systems do not allow files longer than &3FFFF bytes, but with our system files can be as long as one disc side.
- Discs may be created in either single or double density format with the built in formatter and in single density mode are fully compatible with normal Acorn format discs.
- The density of the disc you put in is automatically sensed by the system and you are informed of the density in the catalogue display.
- Copying of files between single and double density discs is automatically catered for.
- The double density system is of course faster than single density.

NOW Our 8271 emulator has been extended to cope with illegal sector IDs.

The Watford Electronics DDFS implements an extremely comprehensive 8271 emulator so that commands passed through OSWORD & 7F are correctly interpreted. Other manufacturers thought that read and write sector alone were sufficient – we decided to implement every command of the 8271 that was physically possible. We have allowed the use of all the special registers including bad tracks, allowed access to deleted data etc., etc. The emulator itself takes up around 1K of compactly written machine code. We reckon it will run many of the protected discs now available. Gain all the advantages of the WE DFS together with much increased storage and compatibility with many existing protected discs.
(please write-in for full technical specifications)

Complete Double Density Disc Interface	**£85**
DDFS Manual	**£6.95** (no VAT)

We will exchange your existing Single Density Interface for our DDFS Unit for **£45**
(Carriage £1.50)

3M - 5¼" DISKETTES

Top quality 3M – SCOTCH Diskettes from Watford Electronics (Your 3M Appointed Distributors). All discs carry a lifetime warranty. These discs are quiet in operation and insert positively with their reinforced hub rings. Boxes of 10 supplied complete with self stick, disc labels and write protect tabs.

DON'T SETTLE FOR LESS, BUY THE BEST

● 10 × S/S D/D	40 Track Diskettes	**£13**
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● 10 × D/S D/D	80 Track Diskettes	**£24**

FREE with every pack of 10 × 3M Discs this most useful "Post-It" NOTE PAD & TRAY PACK.

MYSTERIES OF DISC DRIVES & DFS REVEALED

Are you tired of faulty cassettes, and lengthy loading times? Do you want to upgrade your BBC micro to take discs but you get tied up in the plethora of jargon surrounding the choice and use of these systems.

For instance, what is the difference between single and double density formats, how can you use a 40 track disc on an 80 track disc drive? What is the difference between a DFS and disc interface kit? Should you acquire a single Disc drive or twin? What does 48 TPI and 96 TPI discs mean? These are just a few of the questions you may have asked yourself and never found the answer or maybe you have yet to encounter these questions.

Now the mystery of buying a suitable interface and disc drive for your BBC micro is revealed in Watford Electronic's new book entitled 'MYSTERIES of DISC DRIVES & DFS REVEALED'. It describes in fine detail, yet remaining very readable to the beginner, how disc drives operate, the type of interfaces available, which type of discs to use on a disc drive and how data is stored on the discs.

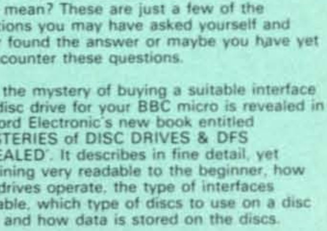
There is even a handy section describing the phrases you are likely to encounter, and how to interpret them. This book must be an essential purchase at £5.95, especially if you own or are thinking of buying a disc system.
£5.95 (Book No VAT)

DISC ALBUMS

Attractively finished in beige leather-look vinyl, these conveniently store upto 20 Discs. Each Disc can easily be seen through the clear view pockets.

£4.25

LOCKABLE DISK STORAGE UNITS



Strong plastic cases that afford real protection to your discs. The smoked top locks down. Dividers and adhesive title strips are supplied for efficient filing of discs.

M35 holds upto 40 discs	**£12**
M85 holds upto 95 discs	**£15**

FLOPPY HEAD CLEANER KIT

The heads in a floppy disc drive are precision made and very sensitive to dirt. Drive manufacturers recommend that you clean the heads approximately once a week. Unless your home or office is dust free one of these kits is a very sensible precaution against losing valuable data. A dirty head can destroy many disks before you realise the trouble. Very simple to use.
Only **£9**

PLASTIC LIBRARY CASES

for Disc Storage 5¼" (holds 10) **£1.80**

BBC MICRO WORD-PROCESSING PACKAGE

A complete word-processing package (which can be heavily modified to your requirements, maintaining the large discount). We supply everything you need to get a BBC micro running as a word-processor. Please call in for a demonstration.

EXAMPLE PACKAGE

BBC Model B, Watford Electronics' DFS upgrade, WORDWISE ROM, Twin 200k Epson drives in beige, Zenith 12" Hi-resolution monitor (Green or Amber), Brother HR15 daisywheel printer. Gemini software: BEEBCALC spreadsheet, analysis and DATABASE software on disc. 10 × 3M disc, 500 sheets fan-fold paper, 4 way mains trailing socket, manuals, all leads and BBC carrying case.

NEW LOW PRICE

Only £1,089

We stock a range of monitors to suit all needs. Choice of a monitor is a matter of personal taste so we recommend that whenever possible, you ask for a demonstration at our shop.

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1431 – Medium resolution as used on the BBC television computer programme	**£165**
1451 – High resolution, suitable for word processing in mode 0	**£237**
1441 – High res. exceeds the capabilities of the BBC micro	**£385**
1431AP RGB + PAL and AUDIO	**£199**
1451AP RGB + PAL and AUDIO	**£285**
Dust Cover for Microvitecs	**£5.50**

All Microvitec Monitors are 14" RGB in their distinctive right angle sturdy metal case or the new beige plastic case. They are supplied complete with connecting lead to the BBC and a 3pin mains plug.

KAGA

KAGA Vision 2 High Res. Colour	**£225**
KAGA Vision 3 Super High resolution, Colour	**£310**

Kaga Monitors are 12" RGB colour units housed in an attractive beige plastic cabinet. They all have as standard, a genuine etched anti-glare screen.

ZENITH

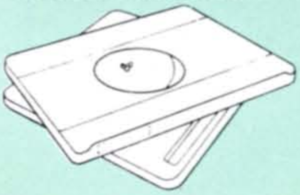
12" Ultra high resolution monochrome monitor. Ideal for word processing as its green or amber screen is very restful to read. The high resolution makes it good for games too – you can really see the detail that has been put into the graphics .... ONLY **£66**

LEADS

BNC Lead for Zenith or Philips	**£3**
RGB lead for KAGA	**£5**

N.B. Carriage on Monitors **£7** (securicor)

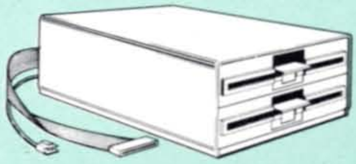
SWIVEL BASE FOR MONITORS



Only £15

DISC DRIVES PRICES SLASHED

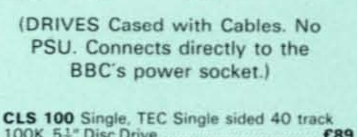
(ALL DRIVES NEW SLIM-LINE)



(DRIVES Cased with Cables. No PSU. Connects directly to the BBC's power socket.)

CLS 100 Single, TEC Single sided 40 track 100K, 5¼" Disc Drive	**£89**
CLS200 Single EPSON Drive, Double sided 40 track, 200K, 5¼"	**£99**
CLS400 Single, Mitsubishi/Epson Double sided 80 track 400K, 5¼" Disc Drive	**£126**
CLS400S Single, Mitsubishi/Epson Double sided 40/80 track Switchable, 400K, 5¼" Disc Drive	**£135**
CLD200 TEC Single sided 40 track 200K twin 5¼" Drives	**£165**
CLD400 Epson, Double sided 40 track 400K, 5¼" TWIN Drives	**£199**
CLD800 Mitsubishi/Epson Double sided 80 track 800K, 5¼" TWIN Drives	**£235**
CLD800S Mitsubishi/Epson Double sided 40/80 track switchable, 800K, Drives	**£269**

DISC DRIVES CASED WITH PSU & CABLES



CS100 TEC Single sided 40 track 100K 5¼" Single Disc Drive	**£119**
CS200 Epson Double sided 40 track 200K 5¼" Single Disc Drive	**£139**
CS400S Mitsubishi/Epson Double sided 80 track 400K 5¼" Single Drive	**£149**
CD200 TEC Single sided 40 track 200K 5¼" TWIN Disc Drives	**£205**
CD400 EPSON Double sided 40 track 400K 5¼" TWIN Disc Drives	**£215**
CD800 Mitsubishi Double sided 80 track 800K 5¼" TWIN Drives	**£295**
CD800S Mitsubishi Double sided 40/80 track Switchable 800K TWIN Drives	**£299**

- DFS Manual (comprehensive) **£7** (No VAT)
- TWIN Disc Drive CASE with Power Supply to house your own Drives **£38**

N.B. All single Drives with Power Supply will be supplied in a twin Case for later inclusion of a second Drive.

(Carriage on Disc Drives £7 securicor)

P.S.

- You do not require a formatting Disc nor the expensive 40/80 track switchable Drives when using Watford's sophisticated Disc Filing System which has this facility as one of the many facilities incorporated in it as standard.

Cont.

- MITSUBISHI & EPSON Slimline 400K Disc Drives that we supply are Double sided Double Density, 1 Megabyte unformatted, (With BBC Micro 400K after formatting). When used in conjunction with our Double Density Interface, you obtain 725K formatted. Track density is 96 TPI, track to track access time is 3mSec. These drives are very fast, quiet and efficient. We strongly recommend them.
- Extensive test carried out in our workshop has proved that the BBC Micro's own switchmode power supply is capable of driving 2 disc drives and a host of Sideways ROMs without undue heating. We recommend our CLS & CLD range of Disc Drives which will save you considerable expense without sacrificing performance.
- Please send an SAE, for further technical specification on our Disc Drives.

DUST COVERS

(For our Disc Drives)

Single (without PSU)	**£3.20**
Twin (without PSU)	**£3.85**
Single (with PSU)	**£3.25**
Twin (with PSU)	**£3.90**
Twin (side by side with PSU)	**£3.95**

FORTH ROM for BBC

This ROM provides a complete implementation of the FIG-FORTH standard (including editor). Supplied with a large tutorial manual at only **£32**

TINY PASCAL for BBC Micro £54

NEW LAUNCH

ROM-SPELL

OXFORD DICTIONARY

A ROM based fast spelling checker essential to serious word processing users of the BBC micro.

Compatible with the popular word processors VIEW, WORDWISE and also with *SPOOLED text files. Allows misspelt words to be changed without returning to the word processor. Simply load the text and execute the spelling checker, correcting the words as you go along, or all at once at the end.

An optimised word compacting technique gives a comprehensive 30,000 word dictionary as standard as well as a user defined dictionary for specialist applications. Efficient data storage also means faster operation, text can be checked at 160 words per minute!!! Equivalent to looking a word up in a standard dictionary in well under half a second!

An ambiguous word checking facility allows partially spelt words to be checked against the dictionary and all the matches displayed. This is ideal when you are uncertain of a spelling and a boon for crossword addicts!

Full access to the dictionary from BASIC allows users to check words from within their own programs. Useful for educational programing and also to compilers of word puzzles and anagram solvers.
Save time spent looking in dictionaries, use ROMSPELL.

ROMSPELL is supplied on a ROM with the dictionary disc and full instructions for Only:

£25

(Please specify 40 or 80 tracks when ordering)

Continued →

THE EPSON RX/FX/KAGA PRINTER COMMANDS REVEALED

So you bought yourself a new printer, because the salesman in the shop showed you how clever it is and impressed you with all sorts of printouts to show its capabilities – he may even have offered you a special price.

However, now that you have got it home and connected it to your BBC microcomputer, you are wondering how to make it perform these magical tasks. The manual seems to give no clues, and when you type in the example programs, the computer throws the LPRINT statements back in your face.

Now what do you do, when this £400 piece of high technology refuses even to move its head, and you have stayed up until 2 in the morning with copious supplies of coffee, desperately trying to print something out. Once again, Watford Electronics comes to your help with our new book entitled 'THE EPSON FX/KAGA PRINTER COMMANDS REVEALED'.

This book describes in plain, easy to understand English how to use your printer (Kaga KP810, Canon PW1080A, or any other Epson FX-80 compatible printer) with the BBC micro, both from Basic and your Wordwise wordprocessor.

It describes in detail how to obtain the maximum in graphics capability from your printer and includes full indexes allowing you to cross index the numerous commands. Every command is explained in detail, with an accompanying BBC Basic program and an example of its use from Wordwise.

This book is superb value at only
£5.95 (Book – No VAT)

EPSON FX/RX NEAR LETTER QUALITY PRINT ROM

EPSON NLQ ROM
for the BBC Micro
ABCDEFGHIJKLMNOPQRSTUVWXYZ
abcdefghijklmnopqrstuvwxyz
0123456789
Ab
RS

Impress your friends and business colleagues with the quality of your letters and printed material with Watford's very simple to use EPSON NLQ! (Near Letter Quality) ROM. Suitable for FX80, RX80, RX80F/T, FX100. Look at the features:

- Simply type *NLQ80/100 and a single VDU code to use NLQ print.
- NLQ is then available without any modifications from BASIC, WORDWISE, VIEW (with NLQ DRIVER) or virtually any other program or language.
- Single codes select PROPORTIONAL type (yes even on the RX80); ENLARGED type; UNDERLINED type. These features can be used seperately or in any combination.
- Full UK character set; Standard 'pica size'; Proportional spacing; Enlarged; Underlined; Normal type.

The NLQ ROM is incredibly easy to fit and use. Supplied complete with Manual.

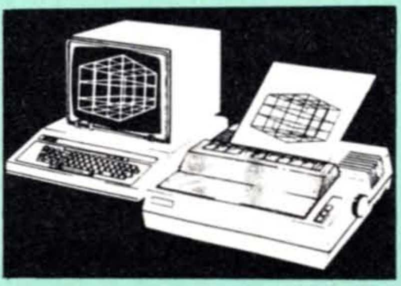
Only: £22

VIEW PRINTER DRIVER for NLQ ROM

This specially written printer driver has been designed to allow View access to the full features of our NLQ ROM.
A must for all VIEW and NLQ ROM users.

£7.00

DUMPOUT 3
NOW WITH EXTRA FEATURES!



A highly sophisticated screen dump ROM. This has to be the most flexible and powerful screen dump ROM yet produced for the BBC micro. It will put on paper anything you see on the screen, including all Mode 7 facilities etc. We have to admit that there is one facility that we cannot replicate – if anyone can supply flashing ink we would like to know!

The ROM also provides window setting utilities and two new OSWORD calls that allow mode 7 graphics pixels to be read and plotted using the standard graphic co-ordinate system. The latest version includes a graphic dump trigger for dumping screens from games whilst they are running.

Two commands are used to operate the dump routines:
*GIMAGE – This provides a full graphics dump of any Mode (including Mode 8). There are many optional parameters but you need only specify the parameters you wish to change.

- V <scale>, H <scale> – These 2 byte numbers give fine control over the size of the dump from minute to enormous. Unlike other dump ROMs, scale works the same in all modes inc. mode 7.
- R <0-3> – Print dump rotated by 0, 90, 180, 270 degrees.
- I <indent> – Set gap from left edge of paper.
- X <min><max>, Y <min><max> – Selects screen area, by default the whole graphics window is dumped.
- P – Dump shows physical colour values.
- G – Grey scale reproduction, dumps otherwise use a negative scale (white prints darkest).
- T Two tone dump for maximum resolution.
- M <mask> – 8 bit colour mask.
- E – Contrast expansion to make mode 7 text and separated graphics stand out clearly from the background.
- C – All mode 7 graphics are printed as contiguous to improve the shading in graphic areas.
- K – Key-triggered dump. The dump does not commence immediately, but can be triggered off later by pressing <SHIFT><0> or <CTRL><ESCAPE>.
- S – Switch-triggered dump. As K, but the trigger is an external switch (not supplied) connected to the user port. The S option can still work with games that corrupt RAM page D.

*TIMAGE <indent> – Does a fast, text only, dump of the contents of the text window in any mode.

*GWINDOW and *TWINDOW – These commands draw the graphics and text windows, respectively, on the screen and allow them to be changed with the cursor keys. Note that GIMAGE and GWINDOW work fully in mode 7. Designed for use with the following printers: CP80, GP80/100/250, CANNON, STAR, KAGA/TAXAN, NEC, SHINWA CP80, GEMINI, EPSON MX/RX/FX, LPVII, NEC PC8023, DMP100/120/200/400, etc. etc.

Price including comprehensive manual

£24

VIEW

VIEW WORDPROCESSOR
We are supplying the new VIEW version 2.1 allowing printing of memory contents etc **£46**

HI-VIEW

A special version of VIEW designed for use with 6502 2nd Processor. Available on disc, it offers 47K of text memory.

£49

VIEWSHEET (Acornsoft) **£49**

Watford's own Sophisticated VIEW PRINTER DRIVER for Epson FX80 & KAGA KP

To simplify using the full facilities of the Epson FX80 or Kaga KP810 use this printer driver. Full facilities are provided for selecting between fonts etc. The disc includes examples of use and instructions. Available on 40 or 80 track disc (please state which required). **£9**

VIEW DRIVERS FOR JUKI & BROTHER PRINTERS

Only £8

VIEW/VIEW SHEET PRINTER DRIVER for SILVER REED

(Officially approved by Silver Reed)

A range of VIEW Printer drivers to complement the Silver Reed range of printers EXP400/500/550 & 770 EB 50 and converted typewriters EX43/44 & 55.

Only: £8

BEEB PRINTER ROM

"Makes Printing Childs Play"

This utility ROM is designed to simplify using all the facilities of your printer. It has many facilities:

★ Selection of printer modes such as underline, font and size is by 'Single Key' operations.

★ From Wordwise, a single number following OC will select a mode rather than a long and incomprehensible string of control codes. This makes using your printer with Wordwise much more convenient.

★ When using Basic (or other languages) you can have control over the formatting of the output to the printer in the style of a wordprocessor. You can define page top, bottom and side margins etc. with intelligent page skip for binders an option. All supported printers will now respond to form-feed etc. commands.

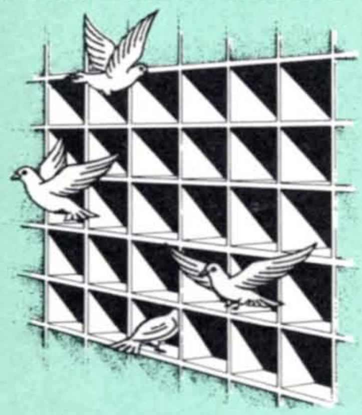
★ User defined characters are printed as you see them on the screen so that non-standard characters are automatically printed out correctly.

★ Commands select the options for the following printers:
GP100, STAR, NEC, MX/FX, KAGA, LP/VII/DMP100, DMP200.
Operates with either parallel or serial interfaces.

★ Supplied with a 50 page manual that is very comprehensive and easy to follow. Please specify printer type when ordering so that we can send the correct function key strip.

Price: £24

TWO DATABASE MANAGEMENT SYSTEMS



DISCDATA

Discdata is an entirely disc based database handling system. It is extremely easy to use through its comprehensive menu system. The simplicity is such that we do not feel the need to provide explanation on use in the written guidance supplied with the program. The first-time database user will rapidly become familiar with this package designed throughout to be simple and obvious.
Despite the ease of use this system provides all the facilities needed for complex data handling problems. The length of database that can be handled is only limited by the total space on the disc. You can have up to 20 fields with page length records up to 254 bytes in length. Adding and deleting records, amend titles, field names and records. Sort on any field and search for any record or group of records in any field. The database may be re-formatted after creation, the system will re-write all your files for you automatically. You may add extra fields and extend the length of existing fields freely.
Output formatting is very powerful. You are allowed 40, 80 or 132 column output modes going to printer or screen. Selected fields can be put in any order on the screen or printer, either across the paper or down. Output can start or stop anywhere in the file. Decimal fields are automatically totalled and records output are counted. Version 2, now on sale has improved input and amendments procedures giving full record edit as well as the 3 extra features . . . String searching, Calculations on numeric fields, and the ability to create sub files from your main files.

On disc at **Only £17**

(Please specify 40 or 80 track when ordering)

FILE-PLUS

The File-Plus package is even more powerful and flexible than Disc-Data. It is also largely menu driven but has its own command language for file searching. The 16K ROM contains all the normally required routines, with lesser used options supplied on the utilities disc. All input and output formatting is controlled through screen forms. A full screen editing system is used to define a form which allows tremendous flexibility in the format in which your data is displayed. It is very easy to change from form to form so that you can type in your data with one form, and examine it with others. You will typically design several forms before starting to access the database so that you can quickly and easily see the fields of each record that you want to appear in the layout you decide on. The form system is also used for output to your printer. File Plus has a unique file linking system that allows the entire on-line storage of your system to be used for one database. This can give around 1.5 Megabyte databases using dual drives and double density.
The built in FQL (File-Plus Query Language) can be used for searching the database. Presented in the form of a powerful command language with looping facilities etc. this allows the most flexible access to your data possible. Full arithmetic operations are provided to allow the system to be used for statistical analysis.

Cont.

Operations supported are –, +, *, /, +–999999 9999.9999 and compare facilities =, >,<>>=, >=, <, &,.
Many keywords are supported by the language: assign, compare, display, and, goto, iff, ift, print, read, search, spool and update.
Supplied with a very detailed 70 page manual to explain all the facilities with many examples.

Only £43

(Please specify 40 or 80 tracks for the utilities disc)

DATAGEM

Gemini's 24K ROM based DATABASE Management System

Special Offer: **£105**

PEN PAL–VERSATILE LIGHT PEN SOFTWARE

Do you have a light pen that never gets used? Then this piece of software is for you. This package offers many useful facilities that make the light pen a useful device to own. Facilities included are:

- Pixel, Line and Character definition
- Free hand drawing
- All Colours
- Fill, Refill and stripes
- User defined "Brush strokes" plus character definer
- Grid, Scale and perspective aids 2 to 200 points palletable in one design with Circles and "rubber banding"
- Move design/character to any screen position
- Save and Load screens, User defined characters and line drawings for video titles, own programmes etc.

This program has many uses in education and at home. It is supplied with a comprehensive instruction manual.
Works with Watford, RH, Acorn User, DIY and many other Light Pens.
Prices TAPE .... **£11;** .... DISC **£12**

LIGHT PEN

This Light Pen for the BBC micro is packaged in a neat pen shape with built in switch. Supplied complete with our sophisticated Pen-Pal software on cassette (see elsewhere in this ad).

Only **£23**

(For software on disc please add £2)

DISC EXECUTOR

Disc Executor is a sophisticated disc utility for the transfer of your programs from cassette to disc. It copes with 'locked' files and full length adventures (up to &6E blocks long) and programs that load below &E00. Disc Executor is simple to use and provides menus to prompt the user along the way. Disc Executor will cope with the vast majority of tapes. (Please note that Disc Executor is not compatible with double density disc interfaces – keep reading our adverts though!)

Price only **£10**

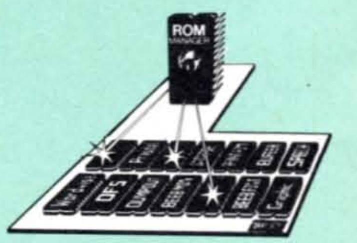
(Please specify whether 40 or 80 track disc when ordering)

ADE

'Systems' complete program development package in a 16K ROM. Full assembling and debugging facilities provided. We are now supplying the new 6502 2nd processor compatible version.

SPECIAL OFFER ONLY **£43**

ROM MANAGER



'Provides comprehensive management of all your installed ROMs – BEEBUG Nov. '84'.
This ROM is unique in its capabilities. It allows you, the user, full control over the BBC Micro's sideways ROM paging system with simple to use commands. This ROM is essential for those with several ROMs. At a simple level ROM MANAGER can be used to remove the problem of clashing command names and allow full use of all the facilities of your ROMs. This is coupled with facilities to completely enable or disable various ROMs in the machine including ROM manager itself.
ROM MANAGER can also be used to develop sideways ROMs using the machine's standard memory. This is achieved by sending sideways ROM calls to your code in RAM, saving the expense of fitting sideways RAM for ROM development purposes. ROM status reports are also given by the ROM, including ROM lengths, checksums, entry points supported and current filing system title.
The ROM also provides facilities to examine ROMs, list function keys for editing, modify RAM (using a HEX/ASCII editor) and list ROM titles neatly and concisely.

All selection between particular ROMs is by the name of the ROM and this may be abbreviated for convenience. ROM numbers can also be used if required. This ROM is very simple and obvious to use. All the facilities are explained in the clear and detailed manual.

Price **£22**

BUFFER & BACKUP ROM

For those with sideways RAM fitted in their machines this utility ROM will make full use of this facility. By using the sideways RAM area for extra memory the following features are implemented:

★ 4K or 16K buffer for parallel printer.
★ Dumps selection of Disc files to Tape.
★ Makes backup copies of tapes on to tape and disc.
★ Displays contents of paged ROMs on screen.
★ Menu display of ROM filing system contents on Shift-Break.
★ Comprehensive manual.

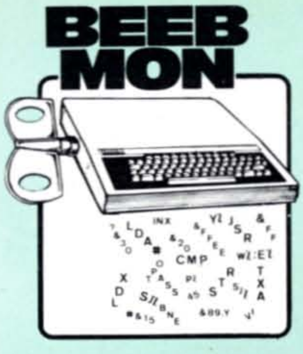
Only £22

ULTRACALC 2

The mark 2 version of the BBC Publications extremely popular electronic spreadsheet ROM. Features include: Simple communication with program, with many prompting messages; Full range of editing commands; Efficient memory usage, allowing large spreadsheets to be constructed; The handling of labels, as well as numbers, as values; Individual variations of the width of columns; Display available in all screen modes; Operates as HICALC on 6502 2nd processor giving 44k of workspace; Flexible printer controls.

Only: **£66**

Continued ⟶



Watford's own Machine code Monitor ROM written by Andrew Bray (Cambridge), co-author of the BBC Micro Advance User Guide.

The most powerful and versatile machine code monitor ROM yet written for BBC Micro. It has all the normal memory editing, moving and relocating facilities, plus all editing is with a full screen editor allowing scrolling up and down memory, entering in Hex, ASCII or standard assembler mnemonics.
In use as a debugging tool, you run code under a total emulation system. Ever felt a desperate urge to set a break point in ROM? No problem – you can even have breakpoint on reading or writing locations in memory and on register contents. The system fully supports debugging of sideways ROMs e.g. BASIC can fully and easily be run from within Beebmon and from there DFS and other sideways ROMs can be used in total emulation mode.
Beebmon can even run itself. In so doing you can nest Beebmon up to a level limited only by the memory size. Beebmon uses 256 bytes of workspace, located anywhere in memory, even on the 1MHz Bus. Beebmon effectively uses no zero page workspace, so your program (e.g. BASIC) can use any or all of the base page. How does it achieve this? By providing a 6502 interpreter all programs running under it exist in a vertual BBC, so special memory locations like the ROM latch are not actually accessed by your programs, instead they alter a location in Beebmon's workspace. Emulation also allows immediate return to Beebmon command level by ctrl-escape no matter what code is being executed at the time. All this exceptional power and flexibility is complemented by a clear and detailed manual included in a value for money price of:

£24

DISASSEMBLER ROM

Discover the hidden secrets of BASIC and the OPERATING SYSTEM with this easy to use progammers tool.
A ROM based machine code Disassembler for the BBC micro. It enables machine code programs to be listed in BASIC/DUMP format and thus is the perfect complement to the built in assembler. It allows Sideways ROMs, files on disk or tape to be listed, and also has a comprehensive editor, allowing mnemonics to be altered directly, as well as HEX, DECIMAL ASCII and BINARY memory editing. There is also a full set of labelling facilities available (up to 3,200 labels), with the major locations and routines already labelled.
Thus DIS-ASM enables any monitor program, such as BEEBMON to be used to much greater effect as it is not necessary to disassemble memory each time the display is altered.

ONLY **£18**

Now
Available

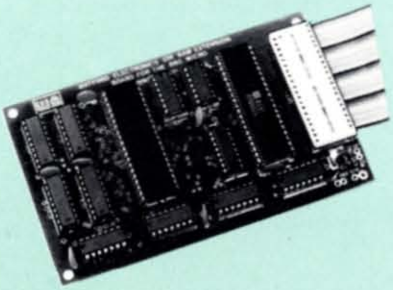
"Acorn Speech Synthersizer"

"We can now supply the official Acorn speech chips, manual and full fitting instructions.

EXTRA SPECIAL PRICE
ONLY: £19.50

32K RAM

EXPANSION BOARD



Now Watford Electronics brings you the latest state-of-the-art MEMORY EXPANSION BOARD for your BBC microcomputer. It's ribbon cable simply plugs into your micro's 6502 processor socket. This compact board which fits inside the computer doesn't just give you 16k or even 20k of extra RAM, but a massive 32K!!!

There are many more useful facilities available with this board:

- The top 20K of the expansion RAM can be used as the screen display memory, leaving all the standard BBC RAM free for programs or data storage. This allows good graphics and long programs to be combined. For instance you could have MODE 0/1/2 GRAPHICS AND 28K OF PROGRAM SPACE. The extra memory can be used by virtually any language or utility such as BASIC, VIEW, WORDWISE (1.20+), WORDWISE-PLUS, etc. and NOW COMPATIBLE with Beebug's TOOLKIT.

- The FULL 32K or the bottom 12K of the expansion RAM can be used as a PRINTER buffer for SERIAL PARALLEL printers, sound channels, RS423, keyboard or speech synthesiser. This allows very long text files to be printed while you are using 28K of program and 20K of graphics! THE BUFFER IS UNIQUE because it replaces one of the BBC Micro's buffers so all the buffer options are available on it. eg. *FX15,21, 138, 145, ADVAL(–no.) etc.

- This board is the IDEAL COMPLEMENT to any WORD PROCESSING system, disc or cassette based. There is no need to wait for slow printers as you can type in long text in 80 column display mode while printing is going on – TWO JOBS DONE SIMULTANEOUSLY!!! (an equivalent printer buffer would cost you £120 +).

- Unlike our competitors, the board is compatible with a vast range of software and hardware available for the BBC microcomputer, including our ROM expansion boards, double density DFS units, and the ATPL ROM extension board. This is because our board is connected to the computer by means of a ribbon cable without soldering. It can either be left in the micro or stuck to the lid with the 4 self adhesive feet supplied.

- The board comes with a comprehensive manual and ROM based software with a large range of commands for machine code and BASIC users, including many *HELP messages.

- Now the ROM has had a host of utilities added to the large number already provided and has been made even easier to install.

Only: £65

GRAPH PAD

With this popular British Micro's Graph-pad, you can add new dimensions to your computer enjoyment. It helps you to create your own application programs by the simple use of the Graphpad. Ideal for Educational use. Supplied complete with Cables, Manual and a two program cassette.

SPECIAL OFFER **£86**

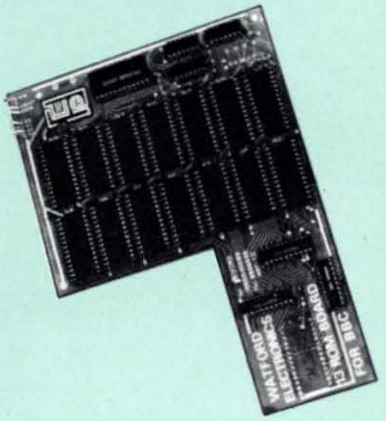
BEEBFONT ROM

BEEBFONT is a remarkable and different concept in BBC software supplied on a 16K ROM. It allows you to display text on the screen in 13 different styles:

It works in modes 0, 1, 2 and 4 using the full colour capabilities of each mode. Characters are printed in the same way as normal. Selection between the various fonts is very easily achieved with Ctrl-V – press this followed by a font number and the output will continue in the new font. Beebfont ROM is particularly useful in display work with the characters produced at twice the normal size.
You can create your own character fonts with the editor supplied. You can also print-out pre-formatted text files using the special characters with Epson FX, RX and NEC printers. The full range of character styles can be used, controlled from within the text. The editor and spooler program are supplied with the package, on cassette or disc. The spooler allows word processor (Wordwise & View) output to be printed in the new characters.
A twenty page manual is supplied. Please state printer type and media for the editor & spooler when ordering (cassette, 40 or 80 track disc).

ONLY **£32**

Mk-2 13 ROM SOCKET EXPANSION BOARD



Now all lines fully buffered – On board battery back-up facility – will now accept EPROMS 2716, 2732, 2764 & 27128 and ROMs 6116 & 6264.
Simply plugs into one of the four ROM sockets currently available in BBC Micro. There are only 5 solder connections to be made. Full instructions are supplied. Unlike other ROM Boards, this board has been ergonomically designed to enable the user, easy further expansion inside the Micro, e.g. Double Density Board, Torch Board, RAM Card, etc., without any clash. (At Watford, we think ahead).
Our Mk2 13 ROM Socket Board enables the User to increase the sideways ROM capacity from the basic 4 sockets upto full 16 capable of being supported by current operating systems. In addition the board is designed with the facility to hold upto 16K RAM, which when switched into operation is automatically selected by any WRITE signal to the Sideways ROM area. This gives the User the ability to write a utility or language and upon pressing break have the utility or language up and running (new ROM software can be developed and tested in situ.)

The Board gives the User, plenty of freedom to explore the possibilities of the new paged ROMs due in the coming months and offers them the chance to develop their own.

All lines are fully buffered and the board meets or exceeds all timings for operation in the BBC Microcomputer.

Supplied ready-built and tested complete with fitting instructions.

Only £30

PCB NI-CAD Battery for ROM Boards.
£2.75

COMPUTER CONCEPT'S ROMS

CARETAKER Basic Utility	£28
Graphics ROM	£28
Disc Doctor ROM	£28
TERMI	£27
COMMUNICATOR	£58

Wordwise

Without doubt a very sophisticated piece of software for the BBC Micro. It has all the features of a professional word processor yet is easy to use.

SPECIAL OFFER THIS MONTH: **£32**

WORDWISE PLUS

Now available from stock **£47**

SIDEWAYS ZIF SOCKET

Now Watford Electronics brings you a ROM board for small budgets or for those of you who do not wish to open up your Micro frequently. It allows you to change ROMs quickly and efficiently with the minimum of effort – no screws to loosen or keyboard to remove. The unit consists mainly of a zero insertion force (ZIF) socket on a small circuit board which is located into the position of the 'ROM Cartridge' and is connected to one of the internal ROM sockets via a ribbon cable.

- Very simple to install. NO SOLDERING REQUIRED. The ZIF eliminates the possibility of damage to your ROM pins when inserting and extracting them.
- The low profile of the socket allows unrestricted access to the keyboard, unlike other cartridge systems. In addition, there are no costly extras, such as ROM cartridges for every new ROM.
- All data and address lines are correctly terminated to ensure correct operation of suitable ROMs with the BBC micro. We also supply a purpose designed see-through storage container with anti-static lining, allowing you to store up to 12 ROMs, protecting them from mechanical and static damage.
- This versatile hardware solves the problem of running out of socket space, simply unplug the ROM and plug in a different one. It is a real must for Professionals and Hobbyists alike.

ONLY **£18**

WORDWISE PLUS UPGRADES

Existing users of Wordwise can upgrade to WORDWISE + for £17. Please return the old WORDWISE package complete with Chip and MANUAL with your remittance and we will send you the new WORDWISE + package.

£17

BEEBUG SOFT

SLEUTH ROM	£25
TOOLKIT ROM	£23
ACORN 1.2 DNFS ROM	£15
ACORN 1.2 OS ROM	£10
ACORN BASIC 2	£20

APPROVED for use with telecommunication systems run by British Telecommunications in accordance with the conditions in the instructions for use.

MODEM 84

PRESTEL TERMINAL

For the BBC Microcomputer

COMMUNICATION
WATFORD ELECTRONICS GIVES YOU
"THE KEY TO WORLD COMMUNICATION"

The Watford Prestel package consists of the B.T. approved Watford MODEM 84 (1200/75 baud full duplex 1200 baud half duplex direct connect) and a very sophisticated Prestel Terminal ROM. Please write-in for full technical literature.

PRICES

MODEM 84 (with Lead & Manual)	£55
MODEM 84 complete with PRESTEL SOFTWARE ROM, Lead and manuals	£75
PRESTEL SOFTWARE ROM +Manual	£20
USER to USER 1200 BAUD SOFTWARE ROM	£18

(At these incredibly low prices for such a sophisticated BT Approved Prestel Terminal, Modem 84 has to be the best buy around)

(Carriage on Modem *£2*)

Nightingale Modem

Now Watford brings you PACE's NIGHTINGALE MODEM PACKAGE including the popular Commstar ROM software for the BBC Micro. Nightingale is considered to be by far the most versatile BT approved modem available at the price for the BBC Micro. It is ideal for home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) as well as 300/300 baud full duplex for communication between BBC and other computers, including bulletin boards. A bargain at our

SPECIAL INTRODUCTORY OFFER

(Price includes COMMSTAR ROM & comprehensive manuals) **£119**

COMMSTAR ROM package **£29**

NEW LAUNCH

16K DISC RAM

This is the RAM you've been waiting for!! This battery backed up, write protectable 16K sideways RAM board allows you to run from disk every sideways ROM available. Beware of other sideways RAM boards which are not backed up as certain ROMs will not run in these boards even though the RAM can be write protected. The Battery Backup facility allows retention of DATA after power off. On switch on the Micro will think the WATFORD DISC RAM is a ROM. Features available are:

- No soldering or modifications to BBC micro necessary.
- Plugs into normal ROM socket fitting neatly under the keyboard allowing room for other add-ons.
- Easy to use. Comes with disk based software to SAVE and LOAD ROMs. Allows you to make backup copies of your ROMs.
- Disk software can be copied onto other discs when disc is full.
- All existing ROMs can be stored on disk and used in DISC RAM.
- No messy plugging and unplugging of your ROMs. Simply Load the one you want into DISC RAM.
- Ideal for Professional users to develop ROMs. Backup facility allows testing of final versions without using EPROMs.
- The switch provided allows backup and write protection to be switched off externally.
- Can also be used as 16K printer buffer RAM.

Only: **£39**

P.S. 16K DISC RAM Board is not designed to work in conjunction with a Sideways ROM Board.

Versatile BEEB SPEECH SYNTHESISER Unit

Beeb Speech Synthesiser

SIMPLY the best! – An unlimited speech synthesis system. Complete with easy-to-follow manual. Controlling software is in ROM so no Cassette Loading problems!

PHONEMES for word synthesis – That means unlimited vocabulary! No extra speech dictionary chips to buy!

BUILT-in Library of approximately 500 words to get you started.

ENGLISH accent – Utilises inflexion techniques to produce highly comprehensible speech.

EASY to use system – Just plug the software ROM into a socket, the Speech unit into the User Port, and away you go! No specialised 'dealer upgrade' required!

COMPACT unit – The whole system is built into a small case – easily tucked behind the computer. Auxillary output socket provided for direct connection to an external amplifier.

HOURS of fun! – Suitable for any application – Games, Educational Programs, Specialised Packages.

We know this all seems to good to be true but DON'T BE LEFT SPEECHLESS! Order your Versatile Speech Unit now!

SPECIAL OFFER £35

Continued →

BOOKS (No VAT on Books)

30 Hour BASIC (BBC Micro)	£6.95
35 Education Programs for BBC	£6.95
40 Educational Programs for BBC	£5.95
100 Programs for BBC Micro	£6.95
6502 Application Book	£11.95
6502 Assembly Language Program	£13.95
6502 Assembly Language Subroutines	£14.25
6502 Machine Code for Beginners	£5.95
6502 Machine code for Humans	£7.95
A young persons guide to BBC Basic	£4.50
Advanced Machine Code Technique for BBC	£7.95
Advanced Programming for the BBC Micro	£6.95
Advanced User Guide for BBC Micro	£11.95
Advanced Graphics with BBC	£9.95
Advanced 6502 Programming	£12.45
Assembly Language Programming on BBC Micro	£7.95
Advanced Programming Techniques for the BBC Micro	£7.95
BBC BASIC for Beginners	£7.95
BBC BASIC	£5.95
BBC DIY Robotics & Sensors	£6.95
BBC Forth	£7.50
BBC MICRO add on guide	£6.95
BBC Micro An Expert Guide	£6.95
BBC Micro Book BASIC Sound & Graphics	£7.95
BBC Micro Graphics and Sound	£6.95
BBC Micro Programs in Basic	£5.95
BBC Micro **ROM PAGING** System Explained	£2.00
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DISC FILING SYSTEM (DFS) Operating Manual for BBC	£6.95
Discover BBC Machine Code	£6.95
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Introduction to PASCAL	£14.95
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Programming the BBC micro	£6.95
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Structured Prog. with BBC BASIC	£6.50
The Complete FORTH	£6.95
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The Epson FX/KAGA PRINTER Commands REVEALED	**£5.95**
Using Floppy Discs with BBC Micro	£5.95
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Wordstar & CP/M made easy	£6.95

Watford brings you

THE AMX MOUSE

'The program is simplicity itself and the user manual is virtually redundant' . . . Micro User Jan. 85.

Bring into your home or office the last word in user friendly input devices for the Beeb. The AMX MOUSE that won the hearts and the minds of thousands of visitors at the Show has arrived at Watford Electronics at a very special price!

Using simple Icons, and small movements of the mouse on a work surface, you can select any one of the functions from the pull down menus. The mouse will operate from within Wordwise, View and many other software packages. The three buttons built in to the mouse are user programmable for many extra functions.

The package consists of the mouse, the advanced controlling software in ROM and a disc containing the Icon designer and the AMS ART software.

To summarise this superb product a comment passed by a very senior authority on BBC micro at the last Micro User Show was, 'My only criticism of the product is that, IT'S TOO CHEAP!'

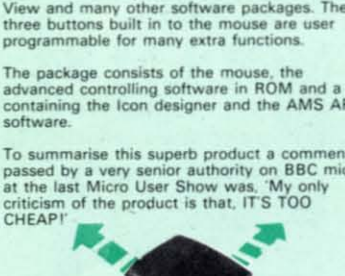
OUR SPECIAL PRICE

ONLY: £68.50

AMX Art Utilities Disc **£12.95**

AMX Desk Disc **£21.50**

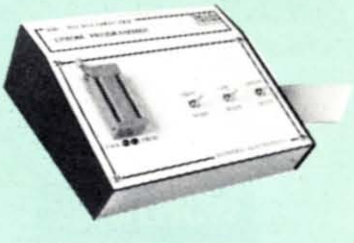
PLINTHS FOR BBC MICRO AND PRINTERS



Protect your computer from the weight and heat of your monitor. The BBC micro plinths have slots for maximum ventilation. The single plinth is suitable for a BBC and monitor, whilst the double height version provides enough room for our stacked or side-by-side dual disc drives or TORCH Disc pack, to be placed in the centre section. If you use our stacked drives, the remaining space can be used for further peripherals e.g. Speech Synthesizer, EPROM programmer or simply stationery. The computer slides neatly in to the lower section allowing easy access to remove the lid. The printer plinth is equally sturdy but without the cooling slots. It allows for access to the paper from the front as well as from the rear, (a facility not often thought of in similar products) if the paper is located beneath the plinth. This is a very convenient way to work especially if your work area is not deep enough to take the printer and paper separately.

SINGLE BBC PLINTH .... **£11** (carr. £1.50)
DOUBLE BBC PLINTH .... **£20** (carr. £2.00)
PRINTER PLINTH .... **£10** (carr. £1.50)

EPROM PROGRAMMER



The Watford Electronics' EPROM programmer for the BBC micro is a high quality self contained package. Programs all popular EPROMs from 2K to 16K: 2716, 2516, 2532, 2564, 2764 and 27128. All manufacturers' specifications have been followed to program EPROMs at the correct speed – wrong timings could destroy your EPROMs. The unit has its own power supply so does not put heavy loads on the BBC power supply as do some other units. Connects directly to the 1MHz bus following all Acorn recommendations on addressing and bus loadings.

SOFTWARE PACKAGE

The software is supplied on an EPROM which plugs into the Micro and is instantly available with a single command (no time wasting as on Cassette/disc loading). It is a fully purpose designed and ingegrated package to simplify ROM development. The system is menu driven with many prompts to avoid any accidents.

Software facilities include:

Load File – Save File – Down Load EPROM – Program EPROM – Verify – Blank Check – Editing of memory contents prior to programming.

Also included is an automatic system to allow Basic programs to be put in EPROM and accessed through the *ROM filing system. More than one program may be put in an EPROM. All these facilities and more are explained in the comprehensive and clear 15 page manual.

SPECIAL OFFER £69

(£3 carr.)

LOW COST 'DIN' EPROM PROGRAMMER

A high performance, low cost, self contained 'DIN' EPROM PROGRAMMER for the BBC Micro. Plugs into the BBC Micro's user port.

The features are:

- Will program 2716, 2732, 2532, 2764 & 27128 EPROMs.
- Copy Eprom into memory and compute checksum.
- Blank check EPROM.
- Program EPROM from memory.
- Verify programmed EPROM and display checksum.
- All * commands may be used from menu mode.
- High speed programming on 2764 & 27128.
- Machine code SOFTWARE supplied in ROM.

Only: **£49.50** (carr. £2)

ANTI GLARE MONITOR SAFETY SCREEN

HEADACHES? TIRED EYES? Don't take pills – Use a Watford Electronics anti-glare filter!

- Made in Britain by a long established glass maker.

Available in 12" & 14" versions – please specify the exact monitor type when ordering.

Special Price: **£16.00** (carr. £1)

SURGE PROTECTOR Plug

Fitted in place of your normal mains plug, this device protects your equipment against mains surges. Nearby lightning strikes, thermostats switching and many other sources put high voltage transient spikes on to the mains. This can lead to data corruption in memory and on disc and can result in spuriously crashing machines. Suitable for computers, Hi-Fi, Fridge Freezers etc. Max Surge current 2KAmp; max. Voltage 250. Essential for serious computer users.

Protection for only **£9.50**

FLEXIBLE KEYBOARD CONNECTOR

A 'Keyboard to Micro' replacement jumper lead.

£4.95

ATTACHE CARRYING CASE for BBC Micro

The Attache carrying case is attractively finished in mottled antique brown leatherette. The case is made of tough plywood, providing a very solid and safe way to carry your BBC micro. There is room provided to fit all the leads necessary behind the computer and manuals in the front. Locks supplied with two keys. Price **£12** (£2 carr.)

DATA RECORDER AND ACCESSORIES

Top quality slimline portable cassette recorder designed specifically for use with home computers. Mains/Battery operated with tape counter. **£20**

DATA CABLE to connect recorder to BBC **£2.50**

DATA CASSETTES
Top grade tested C12 Data cassettes supplied in library cases **35p** each; 10 for **£3.20.**

ASSORTED CONNECTING LEADS

(All ready made and tested)

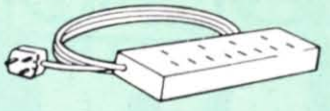
CASSETTE LEADS 7 pin DIN Plug	
to 5 pin DIN Plug + 1 Jack Plug	**£2.00**
to 3 pin DIN Plug + 1 Jack Plug	**£2.00**
to 7 pin DIN Plug	**£2.50**
to 3 Jack Plugs	**£2.00**
6 pin DIN to 6 pin DIN Plug (RGB)	**£2.50**
MONITOR LEADS	
KAGA/SANYO Colour Monitor Leads	**£5.00**
Monochrome monitor leads BMC to Phono	**£3.00**

DISC DRIVE POWER LEADS
Supply from BBC power supply to standard Disc Drive connector.
Single **£3.00** Dual **£3.75**

MISCELLANEOUS CONNECTORS

	Plugs	Sockets
RGB (6 PIN DIN)	30p	45p
RS423 (5 pin Domino)	40p	50p
Cassette (7 pin DIN)	25p	65p
ECONET (5 pin DIN)	20p	30p
Paddles (15 pin 'D')	110p	215p
BBC Power Plug 6 way	80p	–
Disc Drive Plug 4 way	75p	–

4 WAY MAINS DISTRIBUTION SOCKET



4 way top quality mains trailing sockets. Supplied wired up with mains plug ready for use. Can be screwed to floor or wall if required. Very useful for tidying up all the mains leads from your peripherals. Allows the whole system to be switched on from one plug.

£9.99

THE INVESTIGATOR

This sophisticated Utility program on disc, enables you to make security back-up copies of most of your valuable Disc Software. Makes full use of all 8271 (will not run with double density DFSs) facilities to discover the precise format of your protected disc so that an exact copy can be produced. Supplied with detailed instructions. Please specify 40 or 80 track disc when ordering.

Only **£20**

RESERVED

This space is reserved for the launch of our new ROM.

See next month's advert.

ADVENTURE GAMES (level 9)

COLOSSAL ADVENTURE	**£8.50**
ADVENTURE QUEST	**£8.50**
DUNGEON ADVENTURE	**£8.50**
SNOWBALL ADVENTURE	**£8.50**
LORDS OF TIME	**£8.50**

Please add £2.50 for Discs

MISCELLANEOUS

28 pin ZIF SOCKET (Textool) £6.95

28pin DIL PLUG

SOLDER type	£2.90
IDC CRIMP type	£3

RIBBON CABLE

28way **55p/ft;** 34way **60p/ft.**

8way DIP SWITCH **£0.85**

CHIP SHOP

7438	**40p;**	74LS00	**30p**
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74LS123	**£1;**	74LS163	**70p**
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6502A CPU	**£5.45**	65C02 CPU	**£9.50**
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SAA5050	**£8.75**	SN76489	**£5.50**
2764-250nS	**£4.25**	27128-250nS	**£9.75**
6116LP-2K	**£3.25**	6264LP-8K	**£9.95**
8271	**£50**	ACORN DNFS	**£15**
ACORN OS 1.2	**£10**	ACORN BASIC 2	**£20**

TEX EPROM ERASERS

EPROMs need careful treatment if they are to survive their expected lifetime. Over erasure of EPROMs very rapidly turns them into ROMs! The TEX erasers operate following the manufacturers specifications to give the maximum possible working life by not erasing too fast. We use these erasers for all our own erasing work.

- **ERASER EB** – Standard version erases up to 16 chips. **£28**
- **ERASER GT** – Deluxe version erases up to 28 chips. Has automatic safety cut-off to switch off the UV lamp when opened. **£30**
- Spare UV tubes. **£9**

VOLTMACE DELTA 14 JOYSTICK SYSTEM

The Voltmace system provides full facilities for connecting the Delta 14 handset.

Delta 14 handset – On its own makes a high quality centre sprung analogue joystick with fire buttons **£12.50**

Adaptor Module allows use of two joysticks and provides hardware to access all the keys on the keypad of the joystick **£12.55**

Transfer program allows use of the keypad keys and joystick to simulate any key on the keyboard. This works by creating a machine code patch that stays in memory while another program is loaded in. Allows any game to be used with joysticks. Supplied on disc or tape.

Tape **£5.10** Disc **£7.95**

STANDARD JOYSTICKS

These are standard analogue type with a fire button on each joystick. Twin joysticks go to a single moulded plug, long leads provided.

Single Player version **£9.75**
Two Players version **£15.00**

SPECIAL OFFER

2764-250nS £4.25
27128-250nS £9.75

6116LP £3.25
6264LP £9.95

Access

ACCESS HOT LINE
0923 50234
24 Hours

NEW

LOGOTRON LOGO

LOGO is a specially developed language carefully designed to teach the basics of both programming and logical, ordered thinking. Until recently, there wasn't a version of LOGO available for the Beeb. Now Watford Electronics are proud to bring the highly acclaimed version of LOGO from LOGOTRON. This version is recommended by most local education authorities.

Supplied on a 16k ROM for easy fitting, the LCSI LOGO is accompanied by a high quality ring bound manual for easy reference. Please note the LCSI Logo is not just the well known graphics section of LOGO, but the FULL implementation. Educational establishment making a quantity order? Contact us for a possible discount.

ONLY: £55

Prices subject to change without notice and available on request.

MAIL ORDER AND RETAIL SHOP. TRADE AND EXPORT INQUIRIES WELCOME. GOVERNMENT AND EDUCATIONAL ESTABLISHMENTS OFFICIAL ORDERS ACCEPTED.
CARRIAGE: Unless stated otherwise, please add £1 to all cash orders.

VAT: UK customers please add 15% VAT to the total cost incl. Carriage.

SHOP HOURS: 9.00am to 6.00pm. Monday to Saturday. (Ample Free Car Parking Spaces)
ACCESS ORDERS: Simply phone: Watford (0923) 50234. (24 Hours)

Watford Electronics

Dept. BBC, 250 High Street, WATFORD, ENGLAND
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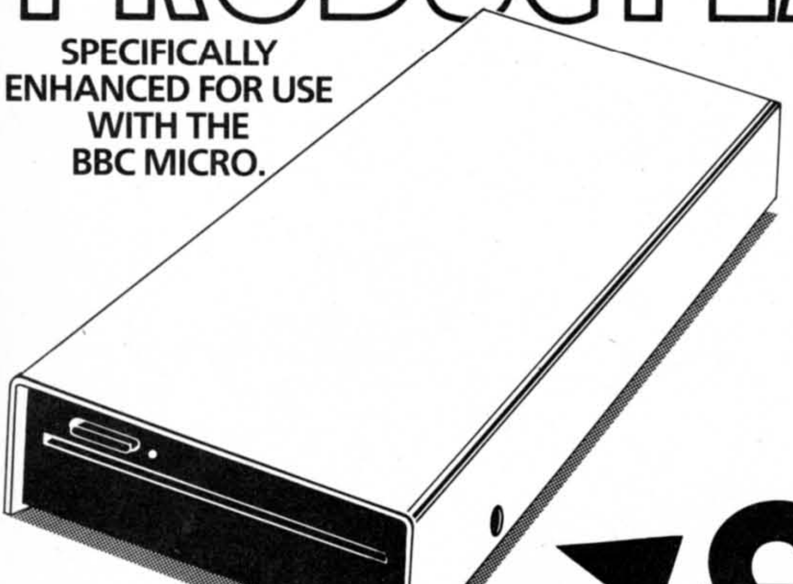
CHASE DATA

NEW

PRODUCT LAUNCH

SPECIFICALLY ENHANCED FOR USE WITH THE BBC MICRO.



Canon 221A "Super-Slim" (33.5mm) 80 track double sided 400K floppy disc drive (40/80 track switching).

Continuing our policy of securing premium quality products at budget prices we are pleased to announce the new generation Canon 221A drive.

Specifications:
80 track double sided disc drive. 40/80 track switching with dual colour LED. Capacity 400K in single density, operates in double density. Direct drive, track to track access 3 ms in 96 TPI mode. Dimensions:– 1/3 standard height, only 33.5mm.

£154 INC.

All canon 40/80 switchable disc drives feature an on-board dual-colour LED on the front panel to show track mode selected. This is coupled with our own unique two-stage illumination. To give a clear operating status, as follows.

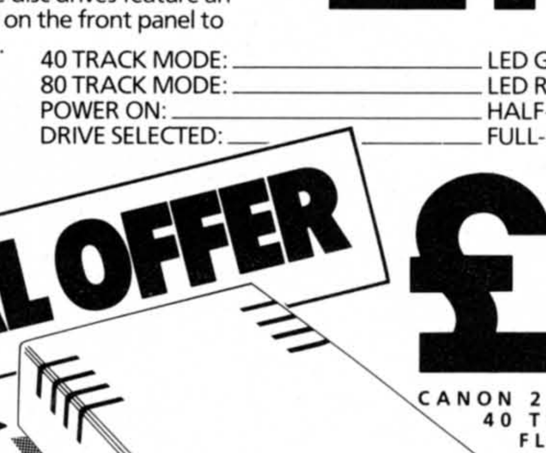
40 TRACK MODE:	LED GREEN
80 TRACK MODE:	LED RED
POWER ON:	HALF-ILLUMINATION *(GREEN OR RED)*
DRIVE SELECTED:	FULL-ILLUMINATION *(GREEN OR RED)*

SPECIAL OFFER

WHILE STOCKS LAST

£95 INC.

CANON 210 2/3 HEIGHT (57.5mm)
40 TRACK D/SIDED 200K
FLOPPY DISK DRIVE
DIRECT DRIVE



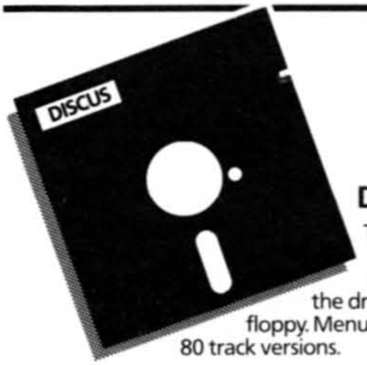
Specifications:
40 track double sided disc drive
capacity 200k in single density
Operates in double density
Track to track access time – 6 ms
Full 12 month warranty with optional extended warranty available

Price Includes:
Drive cased with cables, manual & utilities disc and includes VAT, postage & packing.

FUJI FLOPPY DISCS

	Per box 10	If purchased with disc drive
40 TK SS DD	**£17.60**	**£15.60**
40 TK DS DD	**£24.50**	**£22.50**
80 TK DS DD	**£28.60**	**£26.60**

These prices include VAT & P & P.



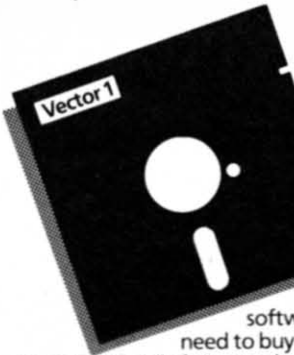
DISCUS

Test utility for testing your own disc drive, at regular intervals to avoid the dreaded flop of your floppy. Menu driven, easy to use, 40 or 80 track versions.

Tests: Motor speed, read/write, steptest, alignment test*, step & read/write test, read only test.

£8.00 inc. **£7.00** if purchased with disc drive.

*This test requires and oscilloscope & alignment disc.



NEW SOFTWARE RELEASE FROM CHASE DATA

Vector 1 –

The ultimate tape to disk utility

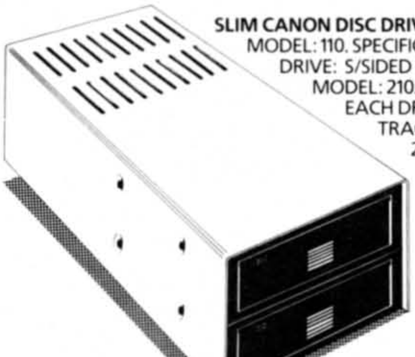
Vector 1 allows you to transfer almost all your tape software to disk. Unlike others, you only need to buy 1 copy of Vector 1 since it transfers tapes to specially formatted program discs. This is easily the most powerful tape to disk utility available.

Vector 2 –

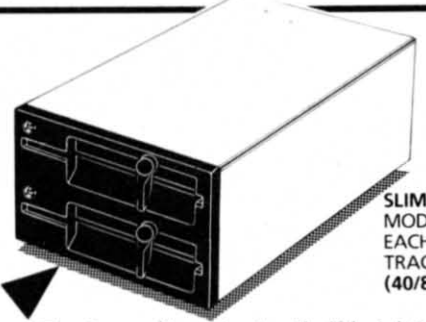
Disk to disk utility

Vector 2 allows you to make backup copies of all your valuable disk software. It is the most advanced utility of its kind available.
It is a condition of sale that neither of these products are used for infringement of copyright.
Not compatible with double density interface.

Vector 1 £16 On its own
£15 If purchased with disk drive
Vector 2 £16 On its own
£15 If purchased with disk drive



SLIM CANON DISC DRIVES:
MODEL: 110. SPECIFICATION OF EACH DRIVE: S/SIDED 40 TRACK 100K. MODEL: 210. SPECIFICATION OF EACH DRIVE: D/SIDED 40 TRACK 200K. MODEL: 220. D/SIDED 80 TRACK 400K. **(40/80 TRACK SWITCHING)**



SLIM SANYO DISC DRIVES:
MODEL: 596D. SPECIFICATION OF EACH DRIVE: D/SIDED 40/80 TRACK 400K.
(40/80 TRACK SWITCHING)

The Sanyo disc drive is a "half-height" 40/80 track switchable unit of standard dimensions, built to Sanyo's usual high standards of quality and reliability.

All inclusive price list: This means: disc drive + case + all power & data cables + UK carriage + utilities disc & manual + VAT.

	CANON				SANYO
Model	**110**	**210**	**220**	**221A**	**596D**
Formatted Capacity per drive on BBC Micro:	100K	200K	400K	400K	**400K**
Single Drive & Case:	£85	£95	£149	£154	**£149**
Single Drive & Case PSU:	£110	£120	£174	£179	**£174**
Dual Drive & Case:	£174	£191	£279	£289	**£279**
Dual Drive & Case/PSU:	£204	£226	£309	£319	**£309**

DON'T FORGET YOUR VECTOR 1 & 2 WHEN ORDERING.

Support:
Warranty: All disc drives sold by Chase Data Ltd come with a full one-year warranty on parts & labour with optional extended warranty on all drives.

Extended Warranty
Your Insurance of trouble free operation
When ordering your disc drive, ask about our second and third year extended warranty scheme. This covers ALL PARTS AND LABOUR and costs from as little as £15.00 on single drives and £23.00 on dual drives.

Non-Warranty Service: As the experts in our field, we can offer service on most makes of floppy disc drive.
Recalibration & Alignment... **£25** per unit inc. VAT (parts extra).
Phone for details: **(Tel: 0784-38487).**

Payment:
By Post: Send your remittance (cheques only please) with your order to:

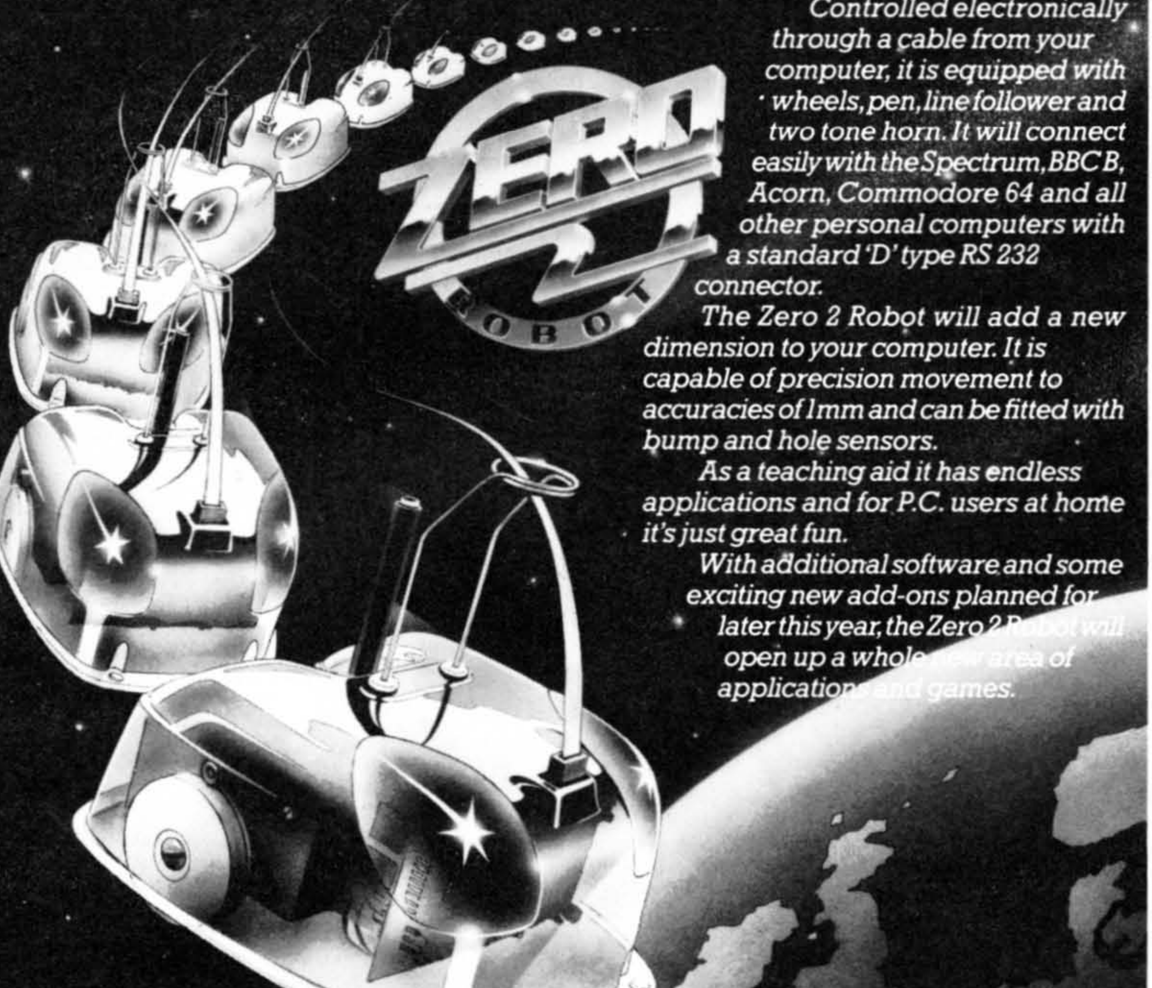
CHASE DATA

Unit 2, Crabtree Road, Thorpe Industrial Estate,
Egham, Surrey, TW20 8RN.

By Phone: **(Tel: 0784-38487).** Allow up to 21 days for delivery.

AT LAST... THE AFFORDABLE ROBOT.

The Zero 2 Robot has arrived. It's the first truly micro robotic system available and remarkably it costs less than £100.



Controlled electronically through a cable from your computer, it is equipped with wheels, pen, line follower and two tone horn. It will connect easily with the Spectrum, BBC B, Acorn, Commodore 64 and all other personal computers with a standard 'D' type RS 232 connector.

The Zero 2 Robot will add a new dimension to your computer. It is capable of precision movement to accuracies of 1mm and can be fitted with bump and hole sensors.

As a teaching aid it has endless applications and for P.C. users at home it's just great fun.

With additional software and some exciting new add-ons planned for later this year, the Zero 2 Robot will open up a whole new area of applications and games.

INTERGALACTIC ROBOTS LTD.,
UNIT 208, HIGHBURY-WORKSHOP,
22 HIGHBURY GROVE, LONDON N.5.

IGR

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Rock steady vision at a rock bottom price

£199.95
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The only thing that seems to stand still on some colour monitors is the price. But at Opus we've now made our RGB High Resolution colour monitor even more affordable – it's down to just £199.95, and the picture quality is as rock steady as ever.

What's more we deliver within 48-hours and give you an unrivalled warranty plan to guarantee your peace of mind for the next two years. And if that's not enough our price includes carriage, VAT and connection leads.

Our JVC monitor (580×470 pixels) has received ample praise from the computer press. Acorn User said:

"... gave steadier pictures than the Microvitec Cub, and the colours were rather better."

Personal Computer News added:

"There is no doubt that the JVC range of ECM colour monitors is excellent value for money... there is no loss in quality of picture after long periods..."

The unit has a 14" screen and is suitable for use with the BBC Micro, Electron, Sinclair QL, Lynx, Oric, Apple, IBM, Amstrad and RML 480Z and most other leading micros.

Simply post the coupon below to: Opus Supplies Limited, or telephone us quoting your credit card number.

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55 Ormside Way, Holmethorpe Industrial Estate, Redhill, Surrey.

Please rush me the following:
(PRICES INCLUDE VAT AND CARRIAGE)

____ High Resolution colour monitor(s) at £199.95 each (inc. VAT)

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(Authorised Torch Dealer and Full Unix Advisory Centre)

ACORN DISC UPGRADE

Now in stock **£115.00** inc VAT

Starter Packs:

BBC Starter Pack

ANBOI/ANBSP **£399.00** inc VAT

Disc Starter Pack

ANBS 001 **£499.00** inc VAT
(BBC 'B' + DFS + Microdrive + 3 games)

BUSINESS STARTER PACK

ANBS 002 **£899.00** + VAT

BBC 'B' + DFS + Disc Drive, Monochrome Monitor, Dot Matrix Printer, Word Processing, Spreadsheet and Database

Electron Starter Pack

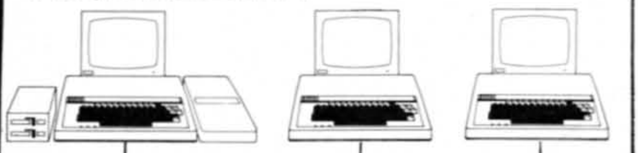
ALAOI/ALASP **£229.00** inc VAT

Networking Torchnet/Econet

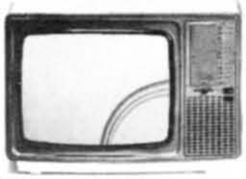
Advanced connection techniques used on our networks considerably reduce joint resistance ensuring lower end to end resistance than by any other method.

All our BBC's and Torches are networked together. Are yours:

If not phone 0329 230671.



NORDMENDE



14" TV/Monitor
£199.00 + VAT

Remote version **£219.00** + VAT
Offer includes RGB/BBC cable.

Buy this superb TV/Monitor from the original distributors (since Sept '82)

TAXAN/KAGA KP810

£260.00 + VAT

Printer price **includes** paper and BBC interface cable.
Screen dump rom available for £11.50

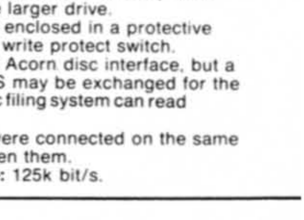
TORCH Disc Pack SPECIAL OFFER

Only **£659.00** + VAT
(Free fitting available if required).

3" Micro Disc £59.95 (inc. VAT)

Disc Interface & Drive
£174.95 inc. VAT)

Micro Disc Drive for the BBC Micro



The Micro disc drive offers a method of low cost quick access to programs. The drive is essentially a small version of a 5¼" disc drive and offers similar features to the larger drive.
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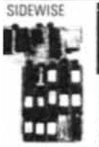

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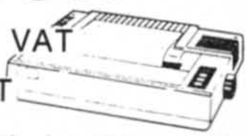

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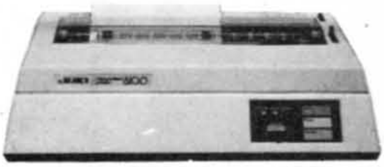

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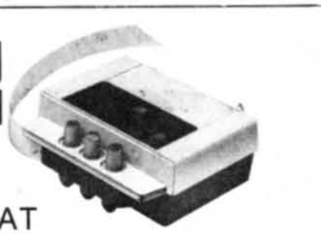

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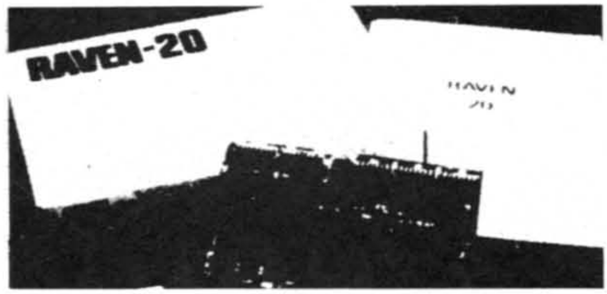

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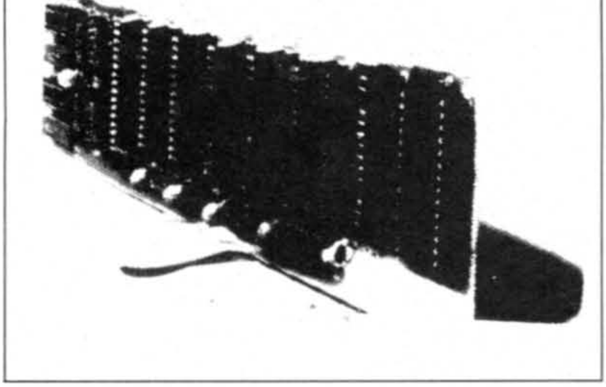

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> *"Of course we are not exactly at the South Pole – but we must be very close" – Roald Amundsen, sledging diary, December 15, 1911.*

South Pole

The 1,000 room adventure that's still waiting to be written

HAVING written this, Amundsen set about calculating his position to an accuracy that surprised his four companions. He had with him a sextant and a chronometer which, in good conditions, can fix a position to about one nautical mile, or one minute of arc on the earth's surface, which is 6,080 ft.

Actually the chronometer was temporarily useless because Amundsen no longer knew which time zone – longitude – he was in. He had to observe the sun for a period of 24 hours to find the time, and hence the direction, of its highest – zenith – position and:

> *"It is interesting to watch the sun wander round the sky at [about] the same altitude day and night. I think we are the first to see this strange sight".*

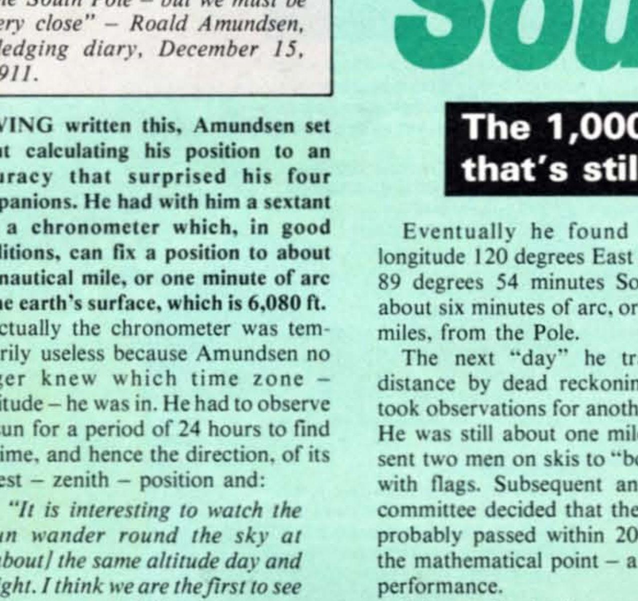


Figure 1: Earth, tilt of South Pole towards the Sun – is maximum about December 21.

Eventually he found he was at longitude 120 degrees East and latitude 89 degrees 54 minutes South, that is about six minutes of arc, or six nautical miles, from the Pole.

The next "day" he travelled this distance by dead reckoning and then took observations for another 24 hours. He was still about one mile out, so he sent two men on skis to "box" the area with flags. Subsequent analysis by a committee decided that these men had probably passed within 200 metres of the mathematical point – a remarkable performance.

Still not absolutely sure of direction, Amundsen then retraced his tracks, left a black flag some 15 miles from the Pole on about the 160 East meridian and then picked up his 169 West meridian cairn markers built on the approach south.

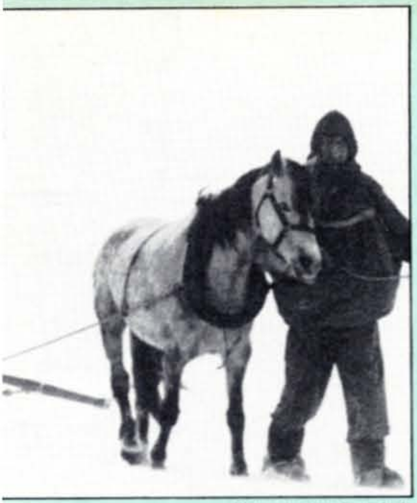
Because of the altitude of the polar plateau – more than 10,000 ft – he refused to travel more than 15 miles a day and his men complained about the boredom of spending 16 hours a day doing nothing except eating and sleeping.

Once down at sea level, however, they began to "sprint", throwing food and fuel away to lighten the load. Navigation was almost unnecessary as they now followed a series of cairns and depots marked by black flags extending five miles to either side of their trail. They covered the 700 miles home in 38 days.

Meanwhile the shadow of the black flag left on the 160 East meridian circled round – getting slowly longer – for 30 days and then served its purpose. Its discovery was due to the eyesight and navigational skill of Lt. Henry Bowers R.N. who had been included in Scott's final party at the last minute because he could navigate accurately.

I will now attempt to show that, given ideal conditions, instruments and a calculator, sun navigation is not difficult in principle.

The earth is a sphere 21,600 nautical miles in circumference. It rotates once



Picture courtesy Central TV

every 24 hours and is tilted 23.44 degrees to the plane of its orbit around the sun. On December 21 the South Pole is at about its maximum tilt towards the sun (see Figure I).

Now consider Amundsen's observations on December 16. If he were exactly at the pole he would have observed a sun zenith of 23 degrees 23 minutes and still slowly rising. What he actually observed was a minimum of 23 degrees 17 minutes at 1600 GMT rising to a maximum of 23 degrees 29 minutes twelve hours later – 0400 GMT on December 17. Hence his position was six miles from the pole on meridian 120 East.

To check this on your BBC Micro enter the NAVIGATE program which, using the SIN function, simulates the changing tilt of the earth as it travels yearly around the sun. Its main inaccuracy is that the earth's orbit is slightly elliptical. Nevertheless the principles are correct.

First test it by assuming the date is December 21 and you are at the South Pole (–90), a puzzling place since your longitude is now any number from 0 to 180 degrees East(+) or West(–) and your watch can only give a global time – GMT or the time of the sun's crossing the Greenwich meridian.

The input is therefore:

Day,Month –> 21,12
Lat (N+S–),Lng(E+W–) –> –90,0

and you should get that the sun's zenith is 23 degrees 26 minutes at 1200 GMT.

Further tests are to put yourself at latitude –23.44 degrees – the Tropic of Capricorn – on the same day and the sun's zenith is 90, which is directly overhead, and at latitude 66.56 – the Arctic Circle – and the zenith is zero, just on the horizon.

Now reverse the program so that you can enter the date as before, followed by the altitude (N or S) and GMT of the sun's zenith so that now it calculates where *you* are on the earth's surface. This exercise I leave to you.

Also test your navigation by doing the sums yourself using a calculator with a SIN function. Just modify the program to generate random latitudes, longitudes, print out zenith and time and then INPUT, plus check your estimate. March 21 is a particularly easy date to try.

To make this into an adventure assume that you can't always see the sun and must travel mainly by compass and dead reckoning. This causes problems because the magnetic poles tend to wander by almost 10 miles a year.

For example, the South Magnetic Pole was at 72.5(S) by 155(E) in 1911 and Amundsen started his journey from 78(S) by 165(W). So he had to begin by steering roughly 75 degrees East of North.

Even more peculiar were Scott's bearings since, as he approached the pole along the 160(E) meridian, he was following a compass pointing almost due North.

If you give this information to a program then it is possible to devise a subtle game. You tell it how far you think you have travelled on a compass bearing and it decides where you really are plus, occasionally, letting you shoot the sun.

To make this more realistic you should have to build and relocate depots of food and fuel – this lets you travel faster but entails obvious risks.

Also you could put in the mountains barring the route to the polar plateau with climbable entrances only at the Beardmore (–83,171) and Axel Heiberg (–85,–165) glaciers. These "gaps" could also give bearings which would require some 3-D plotting, but the Elite game showed this is possible.

Of course it would be even more accurate to include Amundsen's dogs – the main reason he made the trip and depot marking so easily – but it takes years to learn how to handle them so it's man hauling all the way.

Unfortunately such a program would be rather boring to play but so was most South Polar exploration – Amundsen's diary is downright dull. After all there was absolutely nothing there when he arrived.

Alice through the VDU

Our monthly foray into Adventure games

```
   10 DIM M(12)
   20 FOR M=1 TO 12
   30 READ M(M)
   40 NEXT M
   50 DATA 285,316,344,10,40,71,101,13
2,163,193,224,254
   60 INPUT "Day, Month ",D,M
   70 tilt=SIN((D+M(M))*2*PI/365)*23.4
4
   80 INPUT"Lat(N+S-),Lng(E+W-) ",Lat,
Lng
   90 S=90+Lat-tilt
  100 IF S>0 AND S<180 THEN 130
  110 PRINT "Sun not visible"
  120 GOTO 60
  130 IF S>90 THEN S=180-S
  140 Sd=INT(S)
  150 Sm=INT(60*(S-Sd)+0.5)
  160 G=12-Lng/15
  170 Gh=INT(G) MOD 24
  180 Gm=INT(60*(G-Gh)+0.5)
  190 IF (Lat-tilt)>0 THEN D$="(S)" EL
SE D$="(N)"
  200 PRINT "Sun zenith = ";Sd;"d ";Sm
;"m";D$;" at ";Gh;"h";Gm;"m GMT"
  210 GOTO 60
```

Listing I: The Navigate program

Scenario for four

Spooky Manor
Acornsoft

HOWEVER, if polar exploration is not your forte, you might like to pay a visit to Acornsoft's Spooky Manor. And since it's produced by their home education division it should be morally uplifting as well.

The plot centres on the old manor, which is haunted. You enter with some

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friends – the door slams and night is falling.

The novelty in this game is that up to four people can play. But they must use the same screen. It's not a real multi-user dungeon like MUD, but that would require at least a second processor plus a network.

Anyway, in this case the screen is split into four windows showing the state of each player – who and where they are, what and who they can "see" and, on request, what each is carrying. If you have a Quinkey system then players can enter commands simultaneously.

The aim is for the players to co-operate in finding a certain object which allows them to exorcise the house and escape. They each have a torch to begin with and start in different rooms.

As they explore and map they should eventually meet each other and can swap objects, say hello and plan co-ordinated moves like lifting heavy objects.

It is difficult to get a real feel for the game playing alone since it is possible to call other players for help. For instance, you reach a locked door and know that Fred has a key, you type CALL FRED and Fred is told that you want him.

ACORNSOFT HOME EDUCATION
Spooky Manor
For the BBC Microcomputer

Admittedly, if you are in a group it's probably quicker to tell him verbally.

A complete map of the three-storey manor is included with the instructions. It is possible to solve the game solo in about an hour but because it's designed to be played by a group it should take a lot longer.

However I can't see how a group can play without separate Quinkeys. Children may *have* to co-operate in the game, but they don't like taking turns and the program does not insist on a cyclic queue.

Also there is no element of competition but this is feasible. A Wizard à la MUD could be chosen and given the power to mess about with any other player alone in a room, such as turning off the lights and moving him and objects around.

The Wizard could only do this a few times and the players could stick together to find where the Wizard is hidden, as he is not allowed to move himself.

A game like this should be possible on a micro and would give a taste of the MUD atmosphere, plus more complex problems to solve.

Of course MUD really depends on the machinations of the Wizard, Dungeon Master or teacher so the next version should have a suitably gory end when the three "educated" tinies simultaneously break down the door to the staff common room.

Pointing in the right direction..

The Music Box
Selective Software

CONTINUING this trend towards educational adventures is The Music Box, a mapping adventure from Selective Software. Specifically a teaching aid, this disc-based adventure contains two games to help school children, from 8 to 14, to learn about bearings (0 to 360 degrees) and compass points (N, S, E, W), plus dead reckoning – that is simple navigation and map making.

The bearings game takes place in the Wild West. You are given a map with 12 dots or locations. To move you have to measure and give the bearing, relative to North, of the destination dot from the current dot to an accuracy of two degrees.

Get it right and you move – accompanied by some animated graphics and strange comments. Who in tarnation is Hopalong Cassidy?

As usual you can swop this for that or the other until eventually you reach Culver City and get a KEY and a password which lets you play the Sailing Ship game.

This second game is more difficult because all you have is a blank grid with a starting square which lies somewhere off a desert island. It has five ports and a thriving economy of fish, wood, soap, rice and gold.

You have to map the coast of the island by travelling carefully N, S, E or W and then looking at the view in the eight adjacent squares. You can also climb the crow's nest and look two squares away in a given direction.

Teachers – and reviewers – get a map of both games plus nearly all the answers. To put teacher on the spot I solved it in less than an hour – the final password is HAZEL – but again the intention is to aid children learning how to navigate in a group via calculation and mapping, plus taking notes to write an essay on their findings.

Some children's maps are included and the exercise should certainly build up pattern recognition ability.

My maps are dreadful scrawls and I was very impressed by the map of Karos Island sent in by Mr K. Earl. It covered eight pages of A4 and was incredibly detailed so, to recover my ego, I have set a really nasty hacker problem (see Listing II).

All you have to do is make the program stop by entering 19 numbers. You can think of it as a combination lock but it's much easier if you draw a map or two-dimensional picture of the problem.

One final hint – there is only about one chance in 18 factorial of stopping it with 19 random numbers, so just guessing won't work.

Alice

```
   10 DIM A(18)
   20 ON ERROR GOTO 30
   30 PRINT"TRY TO HACK ME OPEN"
   40 FOR I=0 TO 18
   50 A(I)=0
   60 NEXT I
   70 FOR I= 0 TO 18
   80 REPEAT
   90 INPUT N
  100 UNTIL A(N) = 0
  110 A(N)=I+1
  120 NEXT I
  130 FOR I=0 TO 5
  140 J=2*I
  150 IF (A(J)+A(J+1)+A((J+2) MOD 12))
<>38 THEN 30
  160 IF (A(J+1)+A((J+5) MOD 12)+A(I+1
2)+A(((I+1) MOD 6)+12))<>38 THEN 30
  170 NEXT I
  180 PRINT"WELL SHUT MY MOUTH"
```

Listing II: Hacker problem

keyzone

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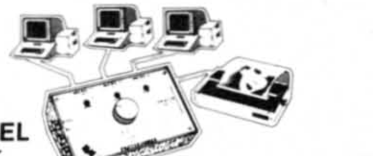

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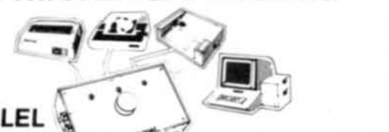

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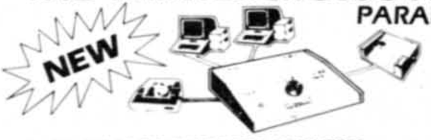
PARALLEL



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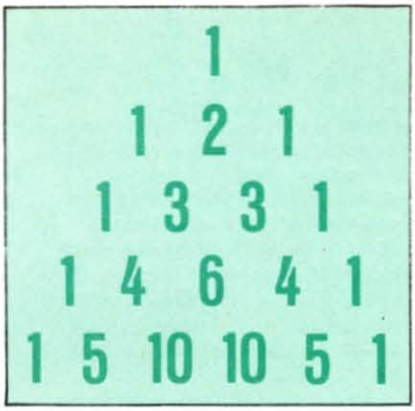
ISO-Pascal: A powerful and practical tool for programmers



ROWAN MALIN reviews Acornsoft's version of the language designed for serious program development

THE arrival of a Pascal system for the BBC Micro has been long awaited. As it turns out the wait was well worth it, for ISO-Pascal ranks alongside Elite as one of the most impressive pieces of software to come from Acornsoft in recent months, albeit for very different reasons.

The package warrants high praise, firstly because of the virtues of the Pascal language, and secondly because of Acornsoft's excellent implementation.

A number of software suppliers have produced ISO or nearly-ISO compatible systems for various machines. One reason for Pascal's popularity is probably due to the aims that Niklaus Wirth had in mind when he designed it.

These were firstly to provide a language suitable for teaching programming in a systematic manner, and secondly to allow for reliable and efficient implementations to be made.

Another principle that guided its design was that, although the language should be suitable for teaching purposes, it should also be attractive to use in the production of large systems – in the words of Niklaus Wirth: "... it should not be a classroom toy, but a practical tool".

A question that may fairly be put is: "Why is Pascal so much better than Basic?" If the Basic happens to be BBC Basic then the question is more difficult to answer than it would be if a comparison was being made between a more normal version of Basic and Pascal.

This is because the designers of BBC Basic made use of a number of features from higher level languages such as Pascal when implementing their language.

These include such things as long variable names and procedures with parameters. However, even BBC Basic lacks many of the facilities that make Pascal such an attractive language.

It is a higher level language than Basic because it allows the programmer to express his or her intentions in a form which is closer to the way in which they think about things. This makes the task of writing programs more natural and the programs correspondingly more readable.

Although it would be naive to attempt to compare two quite different languages simply by listing their respective features, there are a number of obvious areas where Pascal scores over Basic.

Firstly, Pascal includes a wider variety of simple data types such as character types, enumerated types and subrange types. Pascal also provides for dynamic variables from which complex data-structures can be constructed.

Secondly, the range of control structures in Pascal is far wider than that in most Basics. For example, there are WHILE statements, REPEAT statements, block IF statements, CASE statements and compound statements.

The attractiveness of these facilities only becomes apparent in fairly large applications. If your programs are only a few lines long, say less than about 50 lines or so, then you are probably better off sticking to Basic.

If you wish to write larger programs, then Pascal is almost certainly a better proposition as a programming language in which to develop your applications.

Of course Pascal is by no means a perfect language for all applications, and there are a number of areas where it is noticeably deficient. The most well known of these, and one where Basic especially scores, is that of string handling.

Many implementations of Pascal, particularly those on micros, provide some form of extension to deal with strings. Acornsoft's Pascal has no such facility.

Another area where Pascal is often criticised is input/output. Quite often this criticism should be aimed at the implementation rather than the language, especially where it concerns input from terminals and other interactive devices.

There are, however, features of I/O which are sadly lacking from Pascal, such as random access files and more powerful formatted output. It could be argued that the former of these would have added considerably to the complexity of the language, and that formatted output can always be programmed (in Pascal) to suit the application.

Acornsoft's entry into the Pascal market represents one of the few attempts so far to put an ISO Pascal on a micro.

The reason for this lack of small Pascals is probably the complexity of

→

From Page 57

the Pascal standard, which comprises about 70 pages of very thorough and precise specification.

Another reason which may put software houses off trying to write ISO Pascal systems is the existence of a collection of some 700 programs, known as the Pascal validation suite, which is designed to test whether or not a Pascal system conforms to the standard.

It is to Acornsoft's great credit that, not only have they provided a Pascal system for a micro, but also that it passes all the tests in the Pascal validation suite. There are many larger systems running on much more powerful machines which cannot claim this.

The package comes with two versions of ISO-Pascal which correspond to the two levels of compliance with the ISO standard, namely level zero and level one.

The only difference between the two is the inclusion in level one of conformant array parameters which enable arrays with different bounds to be passed to the same procedure.

This useful facility was missing from the original definition of the language, but was introduced when standardisation came along due to the demand for some form of flexible array in the language.

Both versions of Acornsoft's Pascal incorporate several extensions to the language, most of which are concerned with making the most of the BBC Micro's sophisticated I/O facilities such as graphics and sound.

These extensions have been introduced in a consistent and sensible manner, and their use can be regulated by means of a compiler option which can be set to flag all instances of non-standard Pascal.

Acornsoft ISO-Pascal pack contains two 16k ROMs, a disc, a comprehensive manual, a reference card, a function-key label strip for the editor and a copy of Professor Peter Brown's excellent book "Pascal from Basic". This latter provides a tutorial introduction to Pascal for the person who is already familiar with Basic, and does so in a manner which is both amusing and effective.

The idea of supplying a book like this means that the manual can be kept as a reference document on the system, thereby making the relevant information much more accessible. Unfortunately this approach may have the effect of putting off the novice user if she or he were to attempt to find out about Pascal simply by reading the manual.

The two ROMs run the level zero Pascal system. One contains the editor, the interpreter and the command line processor while the other contains the Pascal compiler. They can fit into any of the sideways ROM sockets on the BBC.

Due to space constraints the level one version is supplied on disc and will only work if a 6502 second processor is connected. The error messages are also contained on this disc, which may seem a little unfair on cassette users, but for any serious program development work disc drives really are necessary.

Acornsoft ISO-Pascal is a semi-compiled system, unlike Basic, which is interpreted. This means that a slightly different approach to program development is required than simply entering or loading your program and then typing RUN.

‘. . . an excellent implementation of a powerful and flexible programming language’

To run a Pascal program it must first be entered using a text editor or word processor of some sort. Pascal is a free format language – there are no line numbers and the programmer has a free hand as to how the programs are laid out as regards spaces, blank lines and comments.

Unlike Basic, these take up no space in the program when it is executed and so can, and should, be inserted liberally to improve its readability.

The Acornsoft ISO-Pascal system has an excellent screen-orientated editor which has been specially designed to facilitate editing of Pascal programs. Although it contains many advanced features it always remains simple to use, although a novice could be put off by the apparent complexity of some of the pattern-matching examples given in the manual.

Once a program has been entered it can be saved to tape or disc and then compiled. Compilation is the process of turning the text of the program into a form which the computer can understand and execute. The processing is carried out by a compiler.

The result of compilation is a compact form of code known as BL-code, which can then be interpreted to run the program. This is the reason Acornsoft ISO-Pascal is known as a semi-compiled system – a true compiler translates into the native code of the machine, in the case of the BBC this is 6502 machine language.

Semi-compiled systems are a compromise, being smaller and simpler to implement than true compilers, yet still retaining most of the advantages such systems have to offer such as small and efficient object programs.

Although the source text of a program can be saved before it is compiled, level zero Acornsoft ISO-Pascal does provide what are known as memory files which enable the entire operation of editing, compiling and executing to be carried out without accessing backing storage such as tape or disc.

While this method of working is very quick and convenient, it does mean that, unless a second processor is fitted, programs must be kept fairly short if the dreaded "No room" error is to be avoided.

The system is very flexible however, enabling compilation to or from disc and memory in any combination, so that, for example, a large program can be compiled from disc with the resulting BL-code being sent to another disc file thereby allowing all of the BBC's memory to be used as work space for the compiler.

Once the compiler has done its work the BL-code file can be loaded into memory and executed simply by typing its name. A BL-code file that is already in memory can be started by typing the command "go".

This form of integrated program development arrangement makes the system almost as straightforward to use as Basic.

In summary, Acornsoft ISO-Pascal represents an excellent implementation of a powerful and flexible programming language. It brings the possibility of serious program development to the BBC Micro and, at a bargain price of £69, can be thoroughly recommended.

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(All popular plotters included)
Epson FX80 screen dump routine for Bit Stick. £35 (d)

ACORN WINCHESTER DRIVES

Acorn Hard Discs are now available in 10 and 30 Mbyte versions. The drive plugs into the 1 MHz bus. The ADFS filing system with its hierarchical filing structure provides excellent file management facilities. Data transfer rate of 1 Mbit/sec and average seek time of 85 ms provides the user very fast access to very large amounts of data. File Server Level III can be installed on the Hard Disc before delivery.

10 Mbyte Winchester Drive £1300 (a)
30 Mbyte Winchester Drive £1999 (a)
Add £200 to the cost if File Server Level III is to be installed.

ACORN Z80 2nd Processor

This processor converts your BBC into a CP/M based business micro providing it with computing power a professional would need. The free software package supplied includes three office productivity programs (word processor, spreadsheet and a database), NUCLEUS report generator, a business program ACCOUNTANT plus three programming languages and comprehensive manuals. All for only £348 (a)

See our section on CP/M software for other packages available for use with this processor.

ACORN 6502 2nd Processor

This processor is designed for the serious computer user who wants to get even more out of his micro. It increases memory by upto 44K for BASIC programs and upto 60K for assy. lang. programs regardless of the screen mode (Ideal for VIEW and WW+). Programs run upto 50% faster. This combination offers computing power of systems costing twice as much. £175 (a)

ACORN P-SYSTEM

NEW

The long-awaited-for portable operating system has arrived. Intended for use with the 6502 Second processor, this portable operating system is a complete implementation and comes complete with a Filer, Editor, and compilers for two languages, USCD PASCAL and FORTRAN-77. Widely used in universities and colleges, as well as being popular with business software authors, P-System is user-friendly, offering ease of program development as well as portability. £263(b)

TORCH GRADUATE SYSTEM

The ultimate upgrade — converts your BBC into a powerful 16 Bit business computer and makes it disc and hardware compatible with the IBM PC. With 256K RAM and single/dual drives, it simply connects through the 1MHz bus. (The disc drives can be used in both BBC and IBM mode, without requiring a disc interface.) The top-of-the-range Model G800/2 comes complete with the free Xchange range of software, and includes a full-feature word processor, a financial planner, a database and a business graphics package — all 'linkable'.

(This highly acclaimed software is now available for the IBM PC at a cost of over £400!)

G800/2: £999(a)

OTHER TORCH PRODUCTS

Z80 Card ZEP100 with PERFECT Software Packages + Z80 Basic	£275,(a)
Z80 Disc Pack ZDP240 with software as above	£650 (a)
20Mb Hard Disc + 1 × 400K Floppy Drive	£1,950 (a)
Unicorn 68000, Unix OS/Z80B/512K, 20MB Hard Disc, 400K Floppy	£3495 (a)

TECHTEL 'IN-HOUSE' INFORMATION CENTRE

A unique concept that allows you to provide information in public places. A member of the public is able, without assistance, to view information about your products or services.

Techtel is a complete package allowing you, in conjunction with a BBC and disc drive, to set up an in-house 'Viewdata' type information system. The friendly software package will allow you to set up a 'Prestel' type database of up to 700 pages, (depending on drive) containing both graphics and text. This menu-driven database could hold details of products or services supplied by your company. Typical user would be any company needing to pass information to the public e.g. banks, dept. stores, hotels, travel & estate agents etc. etc.

The package also includes a 'carousel' type display, allowing each frame to be displayed for a specified time, before moving on to the next frame.

A unique facility of Techtel is its 'through-glass' keyboard. Its special numeric keyboard can be placed inside a shop window, yet may be used by customers outside — thus allowing the unit to be left unattended.

The package includes the special keypad, Teletext Loader and Editor, and full instructions. £175(b)

PRINTERS

ALL PRINTERS HAVE A 12 MONTH GUARANTEE

DOT MATRIX

KAGA TAXAN:

- Epson Compatible Control codes
- 80 or 156 Column
- NEAR LETTER QUALITY Print using 23 x 18 matrix
- Text Modes include Normal, Italic, Enlarged, Condensed, Super/Sub Script, Proportional
- Dot Addressable graphics in various modes
- 3K buffer which can also hold user defined characters
- Extra ROM/RAM socket for custom print fonts
- Friction & Tractor feed with built in paper roll holder

KP810 (80 column) **£255 (a)** KP910 (156 column) **£349 (a)**

EPSON:

The industry standard printer offering the quality, reliability and versatility.

RX80T **£210 (a)** RX80FT **£220 (a)** RX100 **£345 (a)**
FX80 **£315 (a)** FX100 **£430 (a)**

BUFFALO 32K Buffer for EPSON PRINTERS

This compact 32K buffer can be fitted internally on any EPSON printer within a few minutes. It does not require external power or any modification to the printer. It will hold about 15 A4 pages of text freeing your computer for other jobs in a fraction of the time it would normally have to wait for the printer to finish all that printing. Supplied with full fitting instructions. £99(d)

DAISY WHEEL

BROTHER HR15: • 14 cps • 3K Buffer • Two colour printing • Proportional spacing • Underline • • Bold • Shadow print • Super/Sub script + many other features.

BROTHER HR15 **£325(a)**

JUKI 6100: • 15 cps • 2K Buffer • Switchable 10/12/15 cpi • Proportional printing • Linear Motor for max reliability.

JUKI 6100 **£325(a)**

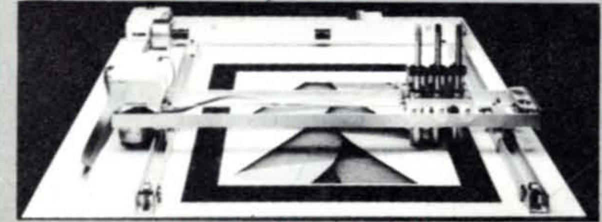
VIEW & VIEWSHEET PRINTER DRIVER GENERATOR

This printer driver generator comes with predefined drivers for EPSON FX80, JUKI 6100 and lets you generate printer driver for any BBC compatible printer. Gone are the days when you had to buy dedicated drivers. The screen driver program supplied with it lets you view the text as it is going to appear on the paper including the bold, italics, underlined characters etc. Supplied on disc. £10(d)

GRAPHICS PLOTTER/WORK STATION

Equally at home in the artists studio, hobbyists workshop, science lab or a classroom, this system has something to offer for everyone. The 3 colour graphics plotter provides both precision and versatility. The carriage can be moved with an accuracy of 0.025cm over an A4 area — the plotter being able to accept paper and far thicker materials at sizes of up to A3. The basic plotter carries 3 colour pens each of which is software selectable. Additional accessories greatly enhance the versatility of the unit without losing the accuracy. The servo controlled drill/router, and scriber can be used on various materials. A unique Opto Sensor (using a Hewlett Packard device) turns the plotter into a high-res scanning digitiser to read & store whole diagrams and photographs. Workstation comes complete all accessories.

Workstation Complete £490(a)



Basic Plotter £270(a)

Opto Sensor **£72(c)** Drill/Router Attachment **£79(c)**
Power Supply: PS12V **£42(c)** PS24V **£78(c)**
Scandump Utility Disc **£14.95 (d)**

TECHNOMATIC

All prices exclude VAT

PRINTER ACCESSORIES

EPSON
Paper Roll Holder £17(d) FX80 Tractor Attachment £37(c).
Interfaces: 8143 RS232 £28(c); 8148 RS232 + 2K £57(c);
8132 Apple II £60(c); 8165 IEEE + Cable £65(c).
Serial & Parallel Interfaces with larger buffers available.
Ribbons: RX/FX/MX80 £5.00(d); RX/FX/MX 100 £10(d);
FX80 Dustcover £4.50(d)

KAGA TAXAN: RS 232 Interface + 2K buffer £78(c); Ribbon KP810/910 £6(d)

JUKI: RS232 Interface £65(c); Spare Daisy Wheel £14(d); Ribbon £2.50(d);
Sheet Feeder £182(a) Tractor Feed Attach £129(a)

BROTHER HR15: Sheet Feeder £189(a) **Ribbons Carbon or Nylon** £4.50(d)

BBC Printer Lead: Parallel (42") £7(d); Serial £7(d)
Printer Leads can be supplied to any other length.

Plain Fanfold Paper with extra fine perforation (Clean Edge):
2000 sheets 9.5" x 11" £13(b) 2000 sheets 14.5" x 11" £18.50(b)
Labels per 1000s: Single Row 3½" x 1 7/16" £5.25(d)
Triple Row 2-7/16" x 1 7/16" £5.00(d)

EPSON HI-80 PLOTTER

EPSON technology has once again scored a first by introducing a sophisticated A4 size plotter that does not need specialised software or programming skills to operate it and yet keep the cost within the reaches of all computer users. Features include 4 pens at a time — upto 10 colours to choose from, a variety of pen nibs, high speed plotting. Powerful software command codes include single commands to plot circles, ellipses or triangles. Line or bar graphs and pie charts can be plotted in a variety of exciting styles very simply by keying in the data into the computer. Detailed leaflet on request. £399 (a)

PRINTER SHARER/BUFFER

A unique sharer/buffer that provides a simple solution to improve system utilisation. It can be connected to up to three computers and it will automatically switch between the computers to scan for data — no manual switching required. High speed data input rate to the buffer cuts down the normal waiting time for the computers for the printing operation to complete and thus allowing the computers to be used for other uses. The 64K buffer would hold over 30 A4 pages of text.

Facilities include: COPY, PAUSE AND RESET. LED indication for percentage of memory available and data source. Mains powered. Send for detailed specification.

TSB 64 Buffer/Sharer **£245(a)**
BBC Cable Set **£30**

PERIPHERAL & COMPUTER SHARERS

We now offer an extended range of peripheral sharers to allow the user to switch between computers, printers and modems. High quality switching mechanisms housed in fully shielded metal cases ensure reliability. No external power input required.

All lines on the sharers are fully switched (36 on parallel and 25 on serial)

	Parallel	Serial
3 Computers to a Printer	36V36-3 £69(c)	25V25-3 £64(c)
4 Computers to a Printer	36V36-4 £85(c)	25V25-4 £74(c)
2 Computers/2 Printers X-over	36V36-X £69(c)	25V25-X £69(c)
BBC Cable Set 3 to 1 (1m ea.)	£32(c)	£34(c)
BBC Cable Set 4 to 1 (1m ea.)	£39(c)	£41(c)

Computer Sharer:
1 computer to 2 printers fitted with Cable for BBC TCS26 £19.50(c).

GRAFPAD

A low cost graphic tablet offering the performance & durability required by industrial and educational users. It is compact, accurate & reliable; working area 240 x 192mm + menu area. Comes complete with a CAD package. £110(b).
DDX software £99(b).

01-208 1177

Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

MONITORS

All monitors supplied with BBC lead

MICROVITEC

All 14" monitors now available in plastic or metal cases, please specify your requirement.

14" RGB		with PAL & Audio	
1431 Std Res	£165(a)	1431 AP Std Res	£205(a)
1451 Med Res	£240(a)	1451 AP Med Res	£280(a)
1441 Hi Res	£389(a)	These monitors can receive TV programs thru a Video Recorder	

20" RGB with PAL & Audio

2030CS Std Res	£380(a)	2040CS Hi Res	£685(a)

KAGA TAXAN 12" RGB

VISION II Hi Res	£225 (a)	VISION III Super Hi Res	£325 (a)

SANYO CD3125NB 14" RGB Std Res £169 (a)

MONOCHROME MONITORS:

SANYO DM8112CX Hi Res 12" Green Screen	£90(a)
KAGA KX1201G Hi Res 12" Etched Green Screen	£99(a)
KAGA KX1202A Hi Res 12" Etched Amber Screen	£105(a)
PHILIPS DGD Hi Res Green Screen	£75(a)
ZENITH 122 Hi Res 12" Amber Screen	£68(a)
Swivel Base for Kaga Monochrome fitted with Digital Clock	£21(c)
Monitor Plinth for the BBC	£13.50(b)
Double Tier Plinth for BBC and flat pack dual drive	£19.50(b)

BBC Leads Kaga RGB £5(d) Microvitec £3.50(d) Monochrome £3.50(d)

RB2 TRACKER BALL

Marconi
RB2

Marconi with its years of experience making tracker balls for use in Military and Air Traffic Control have developed a quality device for the serious hobbyist, for educational uses, and for low cost CAD/CAM applications. RB2 is a compact, ergonomically designed tracker ball that provides precise positional control and rapid direction changing using a freely rotating resin ball in any direction without the limiting stops or the zero point drift of joystick controls. Three switch buttons enable easy software manipulation to incporate the use of the tracker ball. Appropriate software will enable the RB2 to take over the functions of cursor keys in word processing, CAD/CAM applications and two dimensional positional controls of robots, drillheads etc. RB2 which plugs into the user port is supplied with utility programme to use it as a joystick with other software, a comprehensive graphics/CAD program and a program demonstrating its editing capabilities. User guide includes instructions on writing your own programs for the RB2. £52(b)

AMX MOUSE

In conjunction with a controlling ROM this sophisticated mouse has many advanced features such as Icons, Windows etc., these can be used in ordinary programs as well as sophisticated CAD Design. The supplied 'AMX ART' is a superb, yet simple-to-use CAD package allowing the creation of amazing graphical designs. A screendump for drawings is included. It can also be used with Wordwise/View to replace the cursor keys. Supplied complete with CAD Package, ROM and full instruction manual. £75(b)

DISC DRIVES

TECHNOMATIC disc drives come fitted with high quality slimline Japanese mechanisms and represent the state of art in disc drive technology. They are built to highest standards and are all tested to their full performance capability before packaging. All versions of drives are offered with or without integral power supplies. Power supplies for dual drives are of switch mode type and generously rated. Attractively designed steel casings are painted in hard wearing BBC in matching paint. All dual drives can be supplied in stacked version or with built in plinths. The plinth version cases are of sturdy construction to carry any monitor and provide a simple method of having a compact computer system installation. All drives can operate in single and double density modes. Drives are supplied with cables, manual and formatting disc and are ready to be fitted to the computer.

Single Drives:				
1 × 100K 40T SS	TS100	£85(b)	PS100 with psu	£125(b)
1 × 400K 80/40T DS	TS400	£125(b)	PS400 with psu	£149(b)
Dual Drives:				
Stacked Version:				
2 × 100K 40T SS	TD200	£175(a)	PD200 with psu	£200(a)
2 × 400K 80/40 DS	TD800	£275(a)	PD800 with psu	£300(a)
Plinth Version:				
2 × 100K 40T SS	TD200P	£195(a)	PD200P with psu	£220(a)
2 × 400K 80T DS	TD800P	£295(a)	PD800P with psu	£315(a)

DISC DRIVE MULTIPLEXER

A simple device that enables up to four computers to be connected to one single or dual drive. Ideal unit for installing in classrooms where networking is not planned or necessary or the costs have to be kept low or where software information is shared. Several of these units can be installed in series to connect more computers to access the same discs. Units supplied with 5' of cable per outlet as standard. Mains powered.

TDM 4 Quad Unit (upto 4 computers) £135(a)
TDM 2 Dual Unit (2 computers) £75(b)

Note: All computers must be fitted with a DFS

3M FLOPPY DISCS

Authorised Distributor
Data Recording Products

3M

Industry standard high quality discs with guaranteed error free performance for life.

Discs in packs of 10:

40T SSDD **£15(c)**	40 T DSDD **£18(c)**
80 T SSDD **£22(c)**	80 T DSDD **£24(c)**

DISC ACCESSORIES

Single Disc Cable £6(d) Dual Disc Cable £8.50(d)
10 Disc Library Case £1.80(d) 30 Disc Case £6.00(c)
Lockable Storage Boxes 40 Discs £14(c) 100 Discs £19(c)

The FLOPPICLENE disc head cleaning kit is the ideal way to ensure the optimum performance of your drives. The use of disposable cleaning discs eliminate the risk of recontamination and abrasion of the sensitive disc heads and ensure continuously reliable data capture and transmission.

Floppiclene with 20 disposable cleaning discs. £14.50(b).

COMMUNICATIONS

MODEMS

ACORN PRESTEL: The official Acorn add-on — an advanced BT Approved. Auto-Dial, Prestel Terminal ideal for British Telecom Gold. Comprehensive software includes 'tagged' frames, downloading of Telesoftware, saving of frames, printing, sophisticated 'Mailbox' handling c/w editor. A built-in speaker allows line monitoring. A simple !BOOT file allows automatic operation £99(b)

BUZZ BOX **A full spec, BT approved, pocket size, direct connect modem with both originate & answer modes, full & half duplex, allowing access to many databases, bulletin-boards as well as Intercomputer communications. It conforms to CCITT V21 300/300** Baud Standard. Battery/mains powered £62(c) BBC Lead £6 External PSU £9(c)

MINOR MIRACLES WS2000 A world standard modem, having BT approval, covering V21,V23,BELL 103/113/108 and including 75,300,600,1200 Baud ratings. (It even includes 'reverse Prestel'!). This is the modem that will cover 'Prestel' type systems as well as Bulletin Boards both in the UK and abroad. What possibly gives this modem its biggest advantage is its option of computer control. A 25Way RS232 input as well as possible computer controlled auto-dial/auto-answer makes this modem unique. WS2000 £129(c) BBC Serial Cable £7

WS2000 Auto-Dial card: includes an integral loudspeaker for monitoring of the phone line £30(d).

BBC User Port cable (for modem control) £7.

SKI KIT (Allowing total control of the modem by your computer) £10.

DS1 Disc (for Commstar): When used with the Auto-dial card, SK1 Kit, and a user port cable, this software will dial out to Prestel, enter your password etc. and leave you in Commstar. Will also store many bulletin board telephone numbers for autodialling £10.

WS2000 Auto-Answer Card £30(d).

(Please note that the A/D & A/A Cards are still awaiting BABT Approval.)

DEMON A High Performance, yet low-cost Modem. Features include: Auto-dial & auto-answer, Auto baud rate scan, 75,300,1200 Baud rates with V21, V23 and Bell standards. Sophisticated software in ROM allow many features like: Auto-Dial. Redial, Remote facilities etc. An Auto-Dial disc allows storage of commonly dialled numbers. UNICOM £49.95(b) Unicom ROM £20 Unicom Disc £9.95 Unicom Cable £6(d) Not BT approved

TELEMOD-2 A BT approved modem complying with CCITT V23 1200/75 Duplex & 1200/1200 Half-Duplex standard, that allows communication with Viewdata services e.g. Prestel, Micronet etc., as well as using 1200 Baud for communicating with other computer users. Mains powered. TELEMOD 2 £65(b) BBC Lead £7.00

COMMSTAR An ideal communications Rom. Extremely easy to use, yet very versatile. It features both a Prestel mode as well as a Terminal mode, thus offering very good value for money. In Prestel mode, all normal Prestel features are available including, downloading of software, saving and retrieving of pages on disc, page tag, revealing of hidden text etc. Its terminal mode is ideal for bulletin boards etc. All input may be copied into a buffer in memory over which full control is available. Controls of protocols are very simple and any type of file, (not just ASCII) may be sent using XModem protocols. Even includes an elapsed time-clock. £29(d)

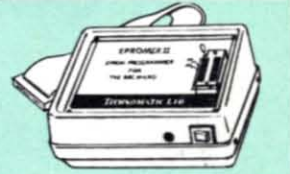
TERMI-II A good all round package for communicating with notice boards, electronic mail services etc. Termi is a semi-intelligent terminal emulator allowing the BBC to act as a dumb terminal, slave BBC graphics terminal, or VT52 terminal. The rates at which data is sent or received is easily set up with rates of up to 4800 Baud with 40/80 col. selectable. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Termi is not suitable for PRESTEL). £28(d)

COMMUNICATOR This is a full 80 col VT100 terminal emulation program on 16K eprom. It is a more advanced program than TERMI and features easy to follow screen menus. The rate at which data is sent or received is easily set up with rates up to 19200 Baud with 80 column text. Allows files to be transmitted from disc, or a copy of incoming data to be sent to a file or to a printer. (Communicator is not suitable for PRESTEL). £59(d).

TECHNOMATIC

All prices exclude VAT

EPROMER II



A sophisticated eprom programmer that handles the full range of single rail eproms (incl 27256) and allows the user full control of the programming process.

Its powerful menu driven software makes the programming of eproms simple, efficient and eliminates the need to have fiddly switches for selecting eprom types, programming voltage or method. The features include:

- Integral power supply ensures no power drain from the computer.
- Interfaces through 1 MHz bus, fully buffered and complies with the Acorn protocols.
- Eproms upto 16K (27128) programmed in single pass.
- Selectable programming voltage 25/21/12.5V
- Selectable programming method — normal or high speed algorithmic. High speed programming enables 27128 to be programmed in just over 2 mins. Normal programming skips addresses FF data to increase programming speed. Automatic verification on completion of programming.
- User can select any section of the eprom from a single byte to its full address range to Blank Check/Read/Program/Verify enabling program development/changes very simple.
- Full screen editor with HEX/ASCII input.
- Full tape/disc filing facility. Data input from keyboard/Tape/Disc/Eprom.
- Constant display of all options selected.
- Several BBC BASIC programs can be entered on a single eprom.

EPROMER II with Manual & Cassette £99(b) Software on disc £3 ROM based software £10

UV ERASERS

UVT1T Eraser with built-in timer and mains indicator. Built-in safety interlock to avoid accidental exposure to the harmful UV rays. It can handle up to 5 eproms at a time with an average erasing time of about 20 mins. £59(b).

UV1T as above but without the timer. £47(b).

For Industrial Users, we offer UV140 and UV141 erasers with handling capacity of 14 eproms. UV141 has a built in timer. Both offer full built in safety features UV140 £61; UV141 £79(b).

SMARTMOUTH

The original 'Infinite Speech' Synthesiser — Still the best around!! A ready built, self contained speech synthesiser unit, attractively packaged with built in speaker. Tailored frequency response audio stages for optimum sound quality. Any word can be easily created — very economical with memory. Plugs into the user port — no roms required. Demo and development programs supplied on cassette (easily transferred to disc) £31(c)

'TIME-WARP' REAL-TIME CLOCK CALENDER

We have broken the price barrier! A low cost unit, allowing the facilities of units costing far more. Built to professional standards, it opens up the total spectrum of Real-Time applications. Possibilities include desk diary/planner, calender, continuous display of on-screen time and date information, automatic document dating, precise timing and control in scientific applications — its uses are endless. Simply plugs into the user port — battery backup is supplied as standard. A full manual as well as Extensive software on cassette (easily transferred to disc) — no ROMs needed. £29(c)

time-warp
real-time clock

RAMROM-15

The advanced sideways ROM/RAM expansion system. This is an external unit, using high quality construction, attractively packaged in a BBC coloured metal case, allowing easy access to all the sockets. (Allows other units to be fitted inside the BBC). Absolutely no soldering is required. Allows 11/12 additional sideways ROMs to be fitted with an option of up to 16K sideways RAM. All commonly available RAM can be used i.e. 4801/6116/6264 or xx128. All the hardware to take the RAM is already fitted e.g. battery backup. For development work and further expansion, most of the 6502 processor signals are available. Supplied with utility disc and full instruction manual. £112(b)

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Please add carriage: (a) £8; (b) £2.50; (c) £1.50; (d) £1 and VAT at 15% to order. Carriage (a) sent by Datapost

ATPL SIDEWISE ROM EXPANSION BOARD

This is a well constructed expansion board, that does not require soldering in its installation. All buses are buffered. It allows full sideways Rom expansion to a total of 16 ROMs. One socket has been split into two 8K sockets to allow the use of 8K byte CMOS RAM chips, giving a total of 16K sideways RAM. This is ideal for sideways rom development, and will also allow downloading of software from cassette or disc. The battery backup option will allow retention of data in the RAM, when power to the computer is removed. Several link-selectable options include the choice of type of Eprom, and a 'write-protect' for the RAM option. £39(d) Back-up Kit £18.

ACORN IEEE INTERFACE

This interface enables a BBC computer to control any scientific and technical equipment that conforms to the IEEE488 standard, at a lower price than other systems, but without sacrificing any aspect of the standard. The interface can link up to 14 separate IEEE compatible devices. Typical applications are in experimental work in academic and industrial laboratories, with the advantage of speed, accuracy and repeatability. The interface is mains powered and comes with cables, IEEEFS ROM, and user guide. £282(a)

ACORN TELETEXT INTERFACE

This interface allows the retrieval and storage of data transmitted by both BBC and IBA. There are currently many educational and other programs being transmitted, and this unit will allow their retrieval absolutely free. In 'Terminal' mode, the system receives and decodes pages from both Ceefax and Oracle. (These pages can be stored). In 'Telesoftware' mode, the system can load, run and execute programs that are transmitted. This unit gives you a professional teletext terminal at a cost effective price. £180(b)

ACORN MUSIC 500

Convert your BBC micro into a sophisticated music composition aid and sound effects generator. Custom made software will provide you with the flexibility to compose, experiment, perform and teach music. Stereo output can be connected to a sound system including your home stereo unit. Full specification on request. £174(a)

DATABASE MANAGEMENT SYSTEM

Gemini DATAGEM

The Definitive Random Access, 24K ROM Based DATABASE MANAGEMENT SYSTEM.

Datagem is the first truly flexible database for the BBC Micro that can make your system really useful and efficient, saving you money in the long run. The system includes a carrier board containing two Eproms, demonstration applications disc in both 40/80T, professional documentation with quick reference card, and 'Trans' utility program. Features include: *almost unlimited file size (max 10MByte) *supports up to 4 drives *Max of 5000 records per file *max 6K record size *max of 62 fields *9 level hierarchical search system with facilities to store results of searches. Searches can be any one of the following: Search, Include, Exclude, Combine, Common or Difference *user defined variables *generates form letters from records. Please ask for leaflet. £112(c).

STARdataBASE A fast machine code, true random access database program in a 16K Eprom. Up to 4096 records in a file, up to 69 fields in a record. The record layout is totally user defined. Entirely menu driven — thus very user friendly. Extremely fast searches are possible using the Keysearch facility. Mailmerging from View and Wordwise, and address labelling. Its printer configuration suits any BBC compatible printer. £75(d)

ROMs/SOFTWARE

VIEW Acorn's new version V2.1 word processor rom. Advantages include printing straight from memory and editing in any mode. £48(c)

HI VIEW Disc based version of VIEW word processor for use with the 6502 2nd processor. Allows 47K of user memory. £52(c)

VIEW INDEX Disc based program to create an index from VIEW text files. Ideal for anyone concerned with writing extensive reports or books. £13(d)

WORDWISE One of the most popular word processors for general use **£34(d).** Wordwise SpellCheck Disc — A must for any serious word processor user. Normal price **£16.50(d).** If bought with Wordwise: No p&p and only £14.

WORDWISE PLUS The new advanced Wordwise on a 16K eprom, for the more specialised users who require added features and flexibility. New facilities include: 2nd Processor compatible allowing 80 column previewing in all cases, a new Basic-like language, new editing features and embedded commands etc etc. Four new programs are also supplied allowing mail-merging, index generating, two-column text printout and continuous processing. A new 56 page introductory manual and a 180 page reference manual complete this rather special package. Finally, it is able to use existing Wordwise files without any modification. £49(d).

SPELLCHECK II: A rom based fast machine code program that works with both VIEW and WORDWISE. Vocabulary disc supplied with 6000 words can be expanded to well over 17000 words on 100K drive. Fully compatible with 6502 second processor. £26(d)

ISO-PASCAL: Acorn's full implementation of International Standard Pascal on two 16K ROMs. Disc Version for use on 6502 2nd Processor also supplied. Comprehensive manual. £60(c)

ACORN LOGO A full implementation of the Logo language from Acornsoft. Supplied as two ROMs with a tutorial course and technical manual. £60(b)

ULTRACALC 2 This enhanced version of the original BBC Publications popular spreadsheet rom includes many new features including full compatability with the 6502 2nd processor running as HiCalc allowing 44K of user memory, operate in any mode, greater flexibility in printer control, spooling as ASCII file etc. All these features are in addition to the existing powerful features such as handling of labels and numbers as values. Column width control and features normality found in well designed spreadsheets. £69(d)

VIEWSHEET Acorn's spreadsheet provides 255 columns and 255 rows and will operate in any mode. Windows can be created which can then be rearranged to provide any print format required. Function keys provide for easy entry of commands. Printer control codes can be used using the printer driver. Fully compatible with VIEW and the 6502 2nd Processor. £52(d)

BCPL A full implementation of the BCPL compiler language consisting of the language rom, disc containing the BCPL compiler, a screen editor, a 6502 assembler, other utilities and programming aids and examples of BCPL code and a 450 page manual. BCPL can be used to develop games programs, commercial packages, system software, to write control systems and to produce programs which otherwise would need to be written in assembler. £52(b)

BCPL STAND ALONE GENERATOR Utilities in this package enable the programs developed using the BCPL rom to be converted so that they can be run on any BBC micro whether it has a BCPL rom or not. Stand alone programs for other 6502 based systems can also be developed. £43(d)

BCPL CALCULATIONS PACKAGE: supplied on disc, it supports floating point, fixed point and fast integer calculations. It includes the BCPL calculation files, example files and a comprehensive user guide. £17.30(b)

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G:FORTH An advanced implementation of FORTH which follows the 79-Standard specification on a 16K ROM and has a full double number extension set. It incorporates an editor, 6502 assembler, very fast turtle graphics and supports extensive string and file handling. It contains 540 predefined words including those for reading joystick ports, produce sounds, set and read the time and produce random numbers. Fully compatible with disc or tape filing systems and works in any mode. Package comes complete with a USER GUIDE, Introduction to FORTH and 16K GFORTH ROM £43(d)

DISC DOCTOR Computer Concept's popular disc utility rom which adds 20 commands to the DFS system. £27(d)

DISCMASTER Beebug's a disc utility which provides additional DFS commands and utilities including disc menu to automatically RUN/*RUN programs, converting 40 track discs to 80 track and enable dual catalog. £16(d)

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PRINTMASTER This ROM features the most versatile screen dump for EPSON MX/RX/FX80 and Kaga 810 printers. It supports three types of dumps. The first allows any graphics on the screen to be dumped. Colours appear as shades of grey. Any part of the screen can be printed at any position on the paper in any one of four orientations. The screen dump may be magnified by any factor x2, x3, x4 etc. A special feature allows true MODE 7 screen dumps with TELETEXT text & graphics. The second dump allows any text to be dumped whilst the third dump will print the contents of a file on disc whilst the computer is doing other things. This is not all. All printer functions can be called up using the *command. *DEFINE allows the printer to define his own characters and store them. *GPRINT allows printing of enlarged text in any position, orientation, size & shade. *WINDOW allows windows to be defined in any size and position on the screen. Can allow you to do printing as background operation while the computer does other jobs. **In short this one ROM does it all.** £28(d)

DUMPMASTER Disc based program that produces fast machine code routines for a variety of printers incl. EPSON MX/FX, STAR 910, Seikosha, NEC PC8023, INTEGREX 132A. Dumps in 8 shades in any mode including teletext mode. Snapshot facility allows dumps from games and other programs. £10(d)

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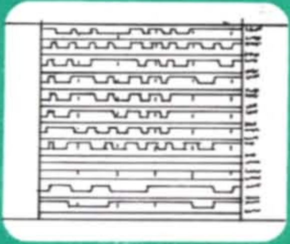

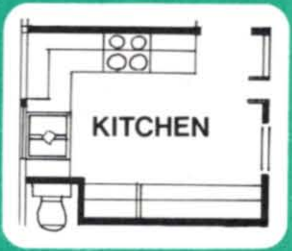

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MAIN FEATURES

* Very user friendly with all controls and commands from the keyboard.

* Special windowing techniques make available to the user almost one million dots allowing a lot more details to be put on the drawing that one would normally expect the BBC to be capable of. (Mode O screen displays only 1 6 the number of dots). The drawing can be 4 screens across and 5 screens up.

* Libraries of user defined shapes such as electronic symbols can be created easily and edited even in the middle of drawing another diagram. Even whole sections of diagrams can be defined as shapes.

* Shapes can be called by name from a library into any part of the diagram and can be moved, enlarged, reduced, rotated in 90° steps and have mirror images made before being finally positioned.

* A zoom facility allows the user to magnify any section of a drawing by upto 50 times to make it easier to insert details.

* User definable grid helps the user set his own scaling for the drawings.

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* Text can be added at any position vertically or horizontally.

* Powerful delete facilities allow deletion of single lines or whole sections with minimum of key presses.

* Printer dump for Epson compatible printers incorporated in the software which allows a full or a sectional screen dump.

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Don't run short of memory – use . . .

OVERLAYS

By D.N. FENNER and R.E. REILLY

IF you have ever tried writing a Basic program of more than a few hundred lines for your BBC Micro you will know how quickly you start to run short of memory, particularly if your program uses a large number of variables and a high resolution graphics mode.

Take a closer look at your program and you may well find that it is not necessary to have the complete program in the memory at one time. If this is the case the technique of overlaying can be used to minimise the memory required for program execution.

In its simplest form (see *The Micro User*, May 1984) overlaying requires the program to be divided up into independent segments, each comprising one or more procedures.

The first of these segments, the zero overlay, remains in the memory at all times, and occupies memory locations between PAGE and TOP (see Figure I).

The remaining segments, or primary overlays, are first SAVEd on disc as files POVL1, POVL2 etc. If LOMEM is raised to a high enough value to allow the largest primary overlay to be accommodated, then each one can be *LOADed in turn as it is needed, immediately above the zero overlay.

For example, the primary overlay POVL1 is loaded at the hexadecimal address (TOP-2)=87F using:

***LOAD POVL1 87F**

A much more versatile approach is possible using the OSCLI routine. This allows Basic variables for the overlay file name (POVL$) and the load address, TOP-2, to be input to the command line interpreter by way of a string argument: **string$="LOAD "+povl$+" "+STR$ (TOP-2)**

In Basic I the *LOAD command is replaced by **$&700=string$: X%=0 : Y%=7 : CALL &FFF7**, where the string is written to memory starting at location &700, the X and Y 6502 registers point to the string, and the OSCLI routine is called at location &FFF7 (see BBC User Guide, p.463). In Basic II the *LOAD command becomes simply **OSCLI(string$)**.

Listing I shows a zero overlay file ZOVL which uses the OSCLI command to load the primary overlay file POVL1 shown in Listing II. The program is run by typing **CH."ZOVL"**.

Using the OSCLI command within the current primary overlay it is possible to load a secondary overlay immediately above it, as shown in Figure II.

The secondary overlay is overwritten whenever a new secondary overlay is

```
   10 REM Zero overlay
   20 PRINT"Zero overlay loaded
 and run"
   30 LOMEM=TOP+1000
   40 povl$="POVL1"
   50 OSCLI("LOAD "+povl$+"
 "+STR$~(TOP-2))
   60 PROC_a
   70 END
```

Listing I: Zero Overlay File "ZOVL"

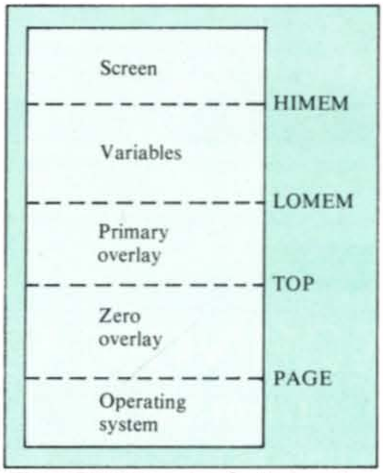

Figure I: Memory map for Zero and Primary overlays

```
 1000 DEF PROC_a
 1010 PRINT"Primary overlay loaded
 and run"
 1020 ENDPROC
```

Listing II: Primary Overlay File "POVL1"

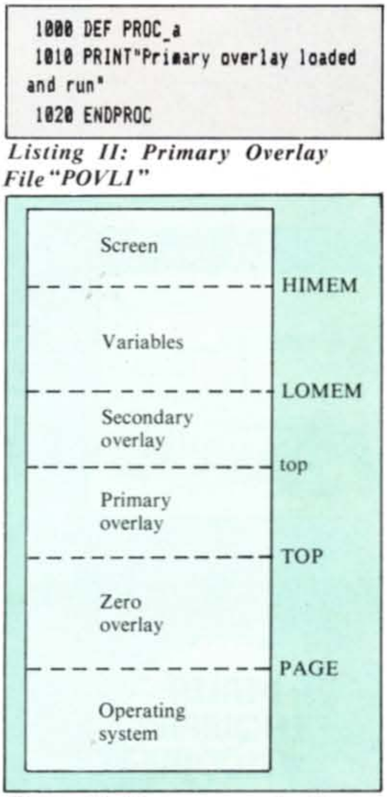

Figure II: Memory map for Zero, Primary and Secondary overlays

loaded. To calculate the load address TOP-2 for the secondary overlays it is necessary to know the size of the current primary overlay file *POVL$*. This can be found using the EXT # function on the file after it has been opened, using OPENIN, as shown in Listing III.

One of the secondary overlays SOVL1 and SOVL2 given in Listings IV and V is loaded, depending on the value of *i%* input by the user in line 1020. The EXT # function is more commonly used in conjunction with data files (see BBC User Guide, p.256), but works equally well with Basic program files.

There seems to be no limit to the complexity of the overlay structure that can be built up, provided the following points are observed:

- Line numbers for any combination of overlays that can share the memory at any time should be in sequence.
- If the same procedure is to be accessed from more than one overlay it must be included in the zero overlay.
- When a new primary overlay is loaded the previous one, and its associated secondary overlay, are overwritten. It follows that a primary overlay may only be loaded from the zero overlay.

Similarly, a secondary overlay may only be loaded from a primary, and not from another secondary overlay.

- LOMEM must be raised initially to a sufficiently high value to allow that combination of overlays requiring the most memory to be accommodated.

If you bear these points in mind you should have no difficulty in using overlays in your next program.

Who knows, you might not need to consider buying that second processor now!

```
 1000 DEF PROC_a
 1010 PRINT"Primary overlay loaded
and run"
 1012 ch=OPENIN(povl$)
 1014 top=TOP+EXT#ch-2
 1016 CLOSE#ch
 1020 INPUT"Which secondary overlay
is to be loaded, 1 or 2  :  "i%
 1030 ON i% GOTO 1050,1050 ELSE PRINT
"No such overlay, try again"
 1040 GOTO1020
 1050 sovl$="SOVL"+STR$(i%)
 1090 OSCLI("LOAD "+sovl$+"
"+STR$~(top-2))
 1100 ON i% GOTO 1110,1130
 1110 PROC_b
 1120 ENDPROC
 1130 PROC_c
 1140 ENDPROC
```

Listing III: Modified Primary Overlay File "POVL1", allowing secondary overlays

```
 2000 DEF PROC_b
 2010 PRINT"Secondary overlay
1 loaded and run"
 2020 ENDPROC
```

Listing IV: Secondary Overlay File "SOVL1"

```
 2000 DEF PROC_c
 2010 PRINT"Secondary overlay
2 loaded and run"
 2020 ENDPROC
```

Listing V: Secondary Overlay File "SOVL2"

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STELLAR

THE year is 2192 and new inhabitable worlds discovered in the last 150 years are running dangerously short of fuel.

It is your task to ensure that the colonists get the fuel they need. They siphon off all the fuel from your craft when you land, paying for the amount they take.

The problem is that the cities are hidden away, in many cases in caves or potholes and are often almost impossible to reach.

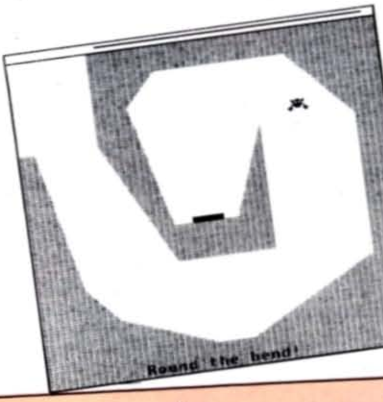
The object of the game is simple. Land your craft on the small pad on the screen, avoiding the sides of the various caves.

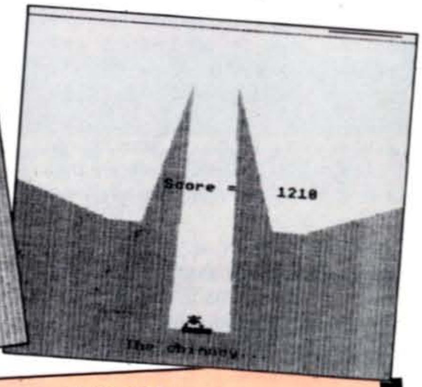
But with 15 different screens of increasing difficulty, you'll have a hard time making it to the end. To add to your problems, you only have a limited fuel supply.

If you do finish all the screens, the game returns to the first screen and the gravitational pull increases. Try to complete the earlier screens as quickly as possible, as this is where you can score the most points. All the screens are possible – honestly!

Keys used are:

Z – Accelerate left
X – Accelerate right
Return – Thrust
Shift/space – Pause/restart





PROCEDURES

init	Defines several variables and arrays.
instructions	Prints the instructions.
skill	Asks for the player to enter skill level.
play(level)	Plays the game with the level determining the gravitational pull.
tune	Plays a tune.
display	Displays your score, screen, level and lives.
variables	Sets up certain variables before each screen.
draw(screen)	Draws any one of the 15 screens.
fuel	Plots onto the screen how much fuel you have.
lander(X,Y)	Exclusive-ORs your lander on or off the screen at the position (X,Y).
move	Checks for keyboard entry to move the lander.
check	Checks to see if the lander is off the limits of the screen or if it has crashed.
score	Calculates your new score from the amount of fuel remaining after each screen.
crash	Makes a crash noise and flashes the lander and fuel.

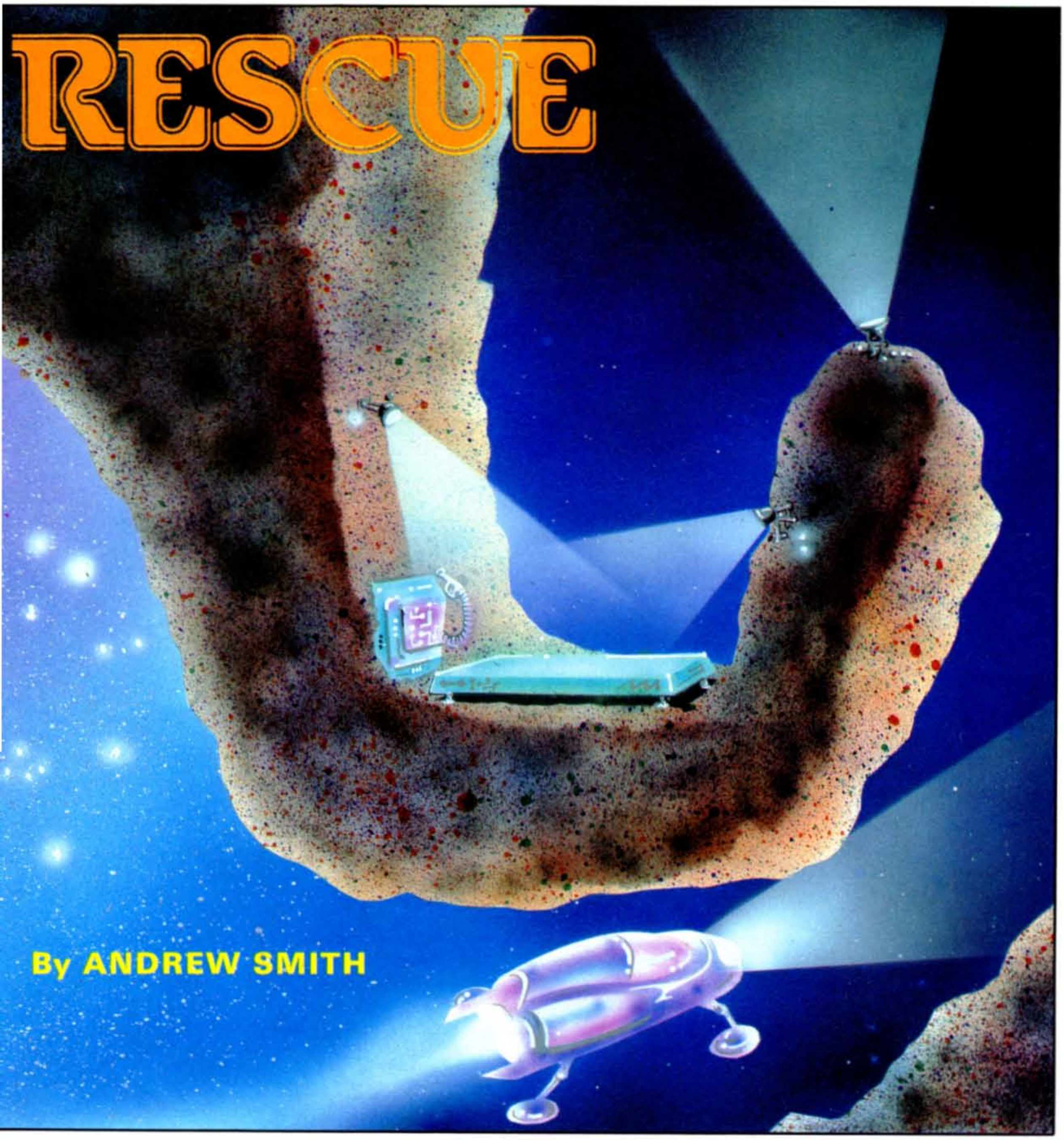
VARIABLES

lives	Number of lives left.
score	Score.
screen	Number of screen.
(X,Y)	Position of lander. Also used in drawing screens.
(OX,OY)	Last position of lander (for smooth movement).
landed	True if landed, False if not.
crashed	True if crashed, False if not.
(XA,YA)	X and Y acceleration.
FU	Fuel.
GP	Gravitational pull.
U	Colour of top pixel of lander (up).
L	Colour of left pixel of lander.
R	Colour of right pixel of lander.
level	Level of play.
A$	Used in printing the instructions.
L$	Lander.
B$	Base to land on.
SC$(1 to 15)	Names of the 15 screens.
A,B,C,LO,NU	General purpose variables.

Stellar Rescue listing

```
1 REM Stellar Rescue
2 REM By Andrew Smith
3 REM (C) Micro User
11 MODE1:VDU5
12 PROCinit
13 REPEAT
14 PROCinstructions
15 *FX21,0
16 A$=GET$
17 PROCskill
18 PROCplay(level)
19 UNTIL FALSE
20 DEFPROCplay(level)
21 lives=3:score=0
22 PROCtune
23 REPEAT
24 screen=1
25 REPEAT
26 PROCdisplay
27 CLS
28 PROCdraw(screen)
29 PROCvariables
30 PROCfuel
31 REPEAT
32 PROClander(X,Y)
33 OX=X:OY=Y
34 PROCmove
35 PROCcheck
36 PROClander(OX,OY)
37 UNTILlanded=TRUE OR crashed=TRUE
```

RESCUE



By ANDREW SMITH

```
   38 IFlanded=TRUE PROClander(X,Y):PR
OCscore:UNTIL FALSE
   39 IFcrashed=TRUE PROClander(X,Y):P
ROCcrash:UNTIL lives=0
   40 UNTILlives=0
   41 ENDPROC
   42 DEF PROClander(X,Y)
   43 GCOL3,3:MOVEX,Y:PRINT L$
   44 ENDPROC
   45 DEF PROCmove
   46 IF INKEY(-1) REPEAT UNTIL INKEY(
-99)
   47 X=X+XA
   48 Y=Y+YA:YA=YA-GP
   49 SOUND&11,-15,60+XA,10
   50 IF FU<1 ENDPROC
   51 IF INKEY(-98) XA=XA-GP
   52 IF INKEY(-67) XA=XA+GP
   53 IF INKEY(-74) YA=YA+GP*2:SOUND&1
0,-15,4,5:FU=FU-2
   54 GCOL0,0:PLOT69,50+(1150-FU),990
   55 ENDPROC
   56 DEF PROCcheck
   57 U=POINT(X+32,Y+12)
   58 L=POINT(X,Y-32):R=POINT(X+62,Y-3
2)
   59 IF L=1 crashed=TRUE
   60 IF R=1 crashed=TRUE
```

Turn to Page 144

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or this....

there's really only one choice -

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Whether you are already an owner or thinking of purchasing your first BBC computer - then the OAK is for you. The OAK offers a versatile unit which can house as much or as little as you require - the beauty being that you can upgrade at any time without having to add-on externally to the OAK unit.

The OAK is available in practically any form, from the basic housing kit (for your existing micro and add-ons) through to the complete ready built unit which, as you can see from the specification, is a pretty sophisticated machine - the mighty OAK.

OAK

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Because of the outward looking design, the BBC Micro Computer has become one of the worlds leading computers. Its popularity is derived from its flexibility as a powerful home computer through to a personal computer widely used in science, education, commerce and industry. This flexibility has been enhanced by the vast range of add-ons that have become available - unfortunately these in themselves have created the micro's major weakness - in many cases they are self-contained units whose cases and cables require a lot of extra space in order to site the computer. This detracts from the overall value of the system.
The OAK computer range overcomes these problems as the vast majority of add-ons are capable of being housed within its own casing.
The OAK has been specially developed to be the most versatile computer system in its field.

The OAK computer

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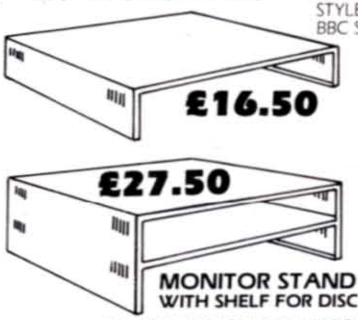

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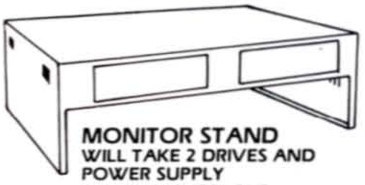

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UCC 500C
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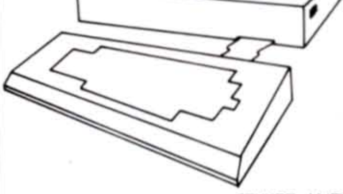

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TO BBC
STRONG METAL CONSTRUCTION.
Incorporating separate
keyboard housing with
connecting ribbon cable,
and computer housing that
functions as a monitor stand.

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UCC 600C
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STRONG METAL CONSTRUCTION
PRICES INCLUDE VAT
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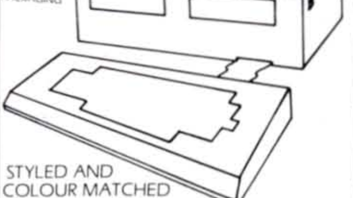

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TO BBC
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- Firmware Format and Verify
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- Simple to fit

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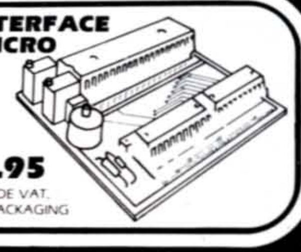

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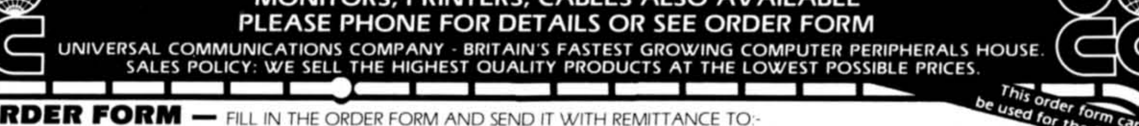

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Only the OAK range prices are exclusive of VAT & delivery - if using this order form for the OAK please add VAT at 15% and £8 delivery to the listed price. All other UCC prices include VAT and delivery *

For more information about the OAK range ☐ or our full range ☐ please tick appropriate box and we will forward more details by return of post.

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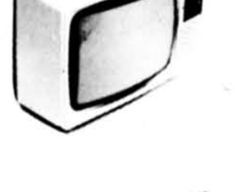

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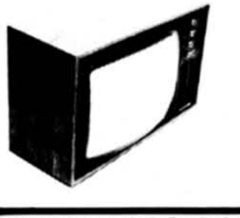

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PDP 1140 System comprising of CPU, 124K memory + MMU 16 line RS232 interface, RP02 40 MB hard disk drive, TU10 9 track 800 BPI Mag tape drive, dual rack system, VT52 VDU etc. etc. Tested and running	***£3750.00***
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PROBLEM PAGE

Your technical queries answered by MIKE COOK

LAST Christmas I got a Quickshot joystick for my BBC. It connects to the user port which means I have to use a converter on tape to play games with it.

Unfortunately it doesn't work with a lot of the new games I am buying. My friends are playing games with joysticks connecting to the analogue port.

Can I buy an interface which would let me connect my user port joystick to the analogue port? – *Craig Stuart, Elgin.*

● The Trak-Ball interface in the February 1985 *Micro User* can be used for this. You will have to work out what wires to connect into the interface.

This can be done by some simple exploration with a continuity meter or a battery and bulb.

If your joystick is the type that only shorts down to earth, as opposed to switching between earth and +5, you can use the circuit in the May 1983 *Micro User*, or adapt the Trak-Ball interface by soldering 3k resistors to +5 from each of the switch inputs.

Shocking monitor

I USE a Mirovitec monitor mounted on a swivelling wall bracket, and after only a few minutes a considerable static charge develops on the screen.

Apart from the unpleasant shocks that this gives when touching the screen, the dire effects of static discharge on computer components and discs is stressed by many people.

How real a risk does this represent to my equipment and discs, and is there a simple way of preventing the build-up?

I have tried Sellotaping a piece of foil between the monitor screen and the stand but with little or no effect.

Does turning the interlacing off with *FX144,0,1 have any effect when using a monitor? It doesn't seem to on mine.

Finally, a joystick problem. I use the standard BBC joysticks and occasionally they fail to respond in one direction – very upsetting when in hot pursuit of a Mamba or Krait!

The problem is due, I think, to the rather wobbly plastic connector, since pushing it home usually solves it.

I have considered replacing this with a better quality plug but where can I get one from and if I cut the old one off what connections should I make in the new plug? – *Gary James, Hull.*

● Static build up on colour monitors or TV screens can be lessened if you wipe the screen with an anti-static solution applied with a clean cloth.

There are many different types on the market and they are usually combined with a VDU cleaning compound. Try the "business" computing shops or DNCS at Truedata House, Green Lane, Heywood, Manchester OL10 2DY.

Turning the interlacing off has the same effect on monitors as it does on TV sets. However, some people like you (and me) say they see no change.

My theory is that the persistence of vision time must vary between people. This would account for one person complaining of flicker while another viewing the same screen does not.

If you an still perceive flicker with the interlacing off then you could try a monitor with a longer persistence phospher. Microvitec do one, but it does not come cheap.

Your joystick problem is a faulty connector. You can get a 15 way D-type connector from Watford Electronics. If you have a moulded-on plug you can cut it open with a sharp hobby knife and see where the wires are going.

Alternatively you can sort it out by tracing the circuit and referring to my joystick article in the May 1983 *Micro User*.

Terminal tactics

I HAVE been using a BBC B with disc interface for about 12 months now, mainly for business applications. One of the most useful aspects of the machine is its word processing capability by using Wordwise.

For printing I have connected a Brother EP44 personal printer via the RS234 interface and this works quite satisfactorily – as demonstrated by this letter.

My query concerns using the Brother as a terminal to transfer letters I write on the printer and store in its memory back to the BBC, and in particular for use and subsequent editing and storage by Wordwise.

I have been unable to achieve this process and hope you may be able to offer some advice.

If the process involves me in writing a program for transferring the data from the Brother to the BBC can this be written in Basic as I have not got to grips with machine code as yet? – *N.I. Powell, Heversham, Cumbria.*

● On the EP44 printer the keyboard is not interfaced with the RS232 interface and so there is no way of informing the computer what key has been pressed. I do not think there is an economical way to do this. Does anyone want to prove me wrong?

Vanished colours

THE quality of the uhf output of my BBC Micro is far below the normal level. The video and RGB output is still an unknown area for me.

When I adjust my TV set so that the picture is sharp the colours disappear and when I use sound it disturbs the screen.

I am sure the computer is the one that doesn't function well as my brother has bought a BBC too and when he tries it on my TV set the picture is brilliant. – *A. Engels, 5922 TG Venlo, The Netherlands.*

● As you can tune the computer to give you a sharp picture it is probable that there is nothing wrong with the video circuits. What is probably awry is the colour sub-carrier circuits.

I can think of two things that can be going wrong. The first is that the crystal oscillator X2 is off frequency. Altering the trimmer VC1 could bring it back.

Or it could be a faulty capacitor C51 or a faulty crystal.

Secondly there could be too much signal from this crystal for your TV set, and by taking it off tune you are attenuating it by

→

Eprom programmer

I AM considering a project at school for my Technology O Level which involves designing and making an eprom eraser/programmer to be run from a BBC Micro.

Please could you help me?

I would be very grateful for a circuit diagram for a simple eprom programmer. Also could you tell me how to erase an eprom, that is, what type of UV bulb and how long it takes?

I would also be very grateful for any advice concerning the software to run a programmer. – *Sean Kerrigan.*

● I do not have a simple eprom programmer circuit for the BBC Micro as I do all my eprom programming on my TRS80. There is one published by Owen Bishop in his Simple Interfacing book but I have heard you will have to write the software.

As this is a project I am sure that you do not want other people doing all the work for you.

As to erasing them you need a UV radiation is damaging to the spectral line. The dose required will depend upon the manufacture of the eprom but will generally take between 10 to 45 minutes.

Be very careful – this type of UV radiation is damaging to the eyes, and appropriate precautions must be taken.

As for a review of eproms and the sorts of signals you need to program, then, see "An introduction to Microcomputers Vol 3" by Jerry Kane and Adam Osborne.

From Page 75

placing it lower down the TV's I.F. filter response.

If this is the case you could try and reduce it by placing a 10pF capacitor between the top of R133 and the modulator case as described in the March 1984 *Micro User*.

No joy

I HAVE owned a BBC Model B over a year now. I was using the Acorn joystick mainly for games, when all of a sudden it stopped functioning.

The fire button is working but as soon as game starts the cursor moves itself to the right and there is no control with the joystick.

There is nothing wrong with the joystick as it has been checked on another computer. What could be wrong apart from the chip?

There is no service available in Saudi Arabia and I do not know much about the inside of the computer. It will be a great help if the problem is simple and I can fix it myself. – *Mohammed Nasir, King Saud University, Riyadh, Saudi Arabia.*

● **A bad chip can be solved by replacing it. The one to try is IC79, D7002 located next to the joystick socket. You could try swapping it with the one from your friend's micro.**

If that does not cure it then it is perhaps a broken connector on the socket. This could have occurred with the continual plugging and unplugging of the joystick.

Examine it carefully and resolder it if possible, otherwise you will have to fit a new one.

Warmed up micro

I HAVE had a BBC model B for about 10 months now and have been using it for playing games and programming.

After using the computer for around one hour the top cover does get quite hot. Is this normal? – *John Man, South Ruislip, Middlesex.*

● **Yes, all computers get hot. It is quite normal. The back of the computer says it uses 50 watts of electricity and some of this naturally gets converted into heat.**

Imagine how hot a 50 watt electric light bulb would get if it was shut up in a box for an hour!

In the dumps . . .

A SHORT time ago I bought a Shinwa CP80 printer. I downloaded a simple word processor from Prestel and began printing.

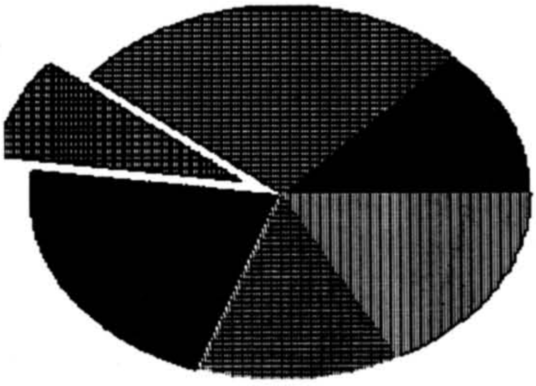
After a while I developed a desire to be able to dump graphic screens.

Armed with the printer manual I quickly became aware that my command of "Japanglish" was inadequate and my venture into bit image printing was floundering.

To my joy I discovered a machine code dump in the January 1984 issue of *The Micro User*.

This worked with my printer and I can now dump histograms and graphs etc and I would like to say thank you, *Micro User*.

I still have a slight criticism however as the aspect ratio of the dumped image is slightly out, giving elliptical circles.



It seems to me that I could overcome this by either reducing the line feed increment of by increasing the print width – preferable since the screen image does not fill the full width of the paper.

Could you please tell me how to modify the dump listing to achieve the required adjustments? – *John Jessop, Warrington, Cheshire.*

● **Aspect ratio distortion is the scourge of screen dumps. It is not always possible to get it right.**

If you reduce the line feed the printed dots will overlap, producing a blurred effect. As you are dealing with dots you can only increase the print width in multiples of two. You do not have enough width to do this.

The Epson printer, for which this was written, allows several different dot widths, but even this will not produce a perfect aspect ratio.

I am afraid that the whole program will need to be re-written for this printer. Anyone fancy doing it?

Analogue port snag

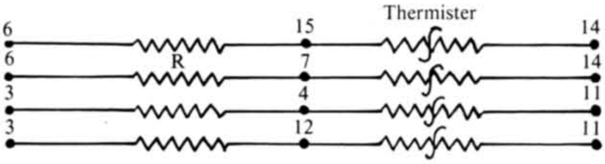
I AM having problems trying to take temperatures via the analogue port. Can you help?

Using the circuit shown with one channel connected it works OK as it does with two.

But when three and/or four are connected all the temperatures are affected by any change in one.

Is it the A/D converter or the circuit?

The 15 pin socket on my BBC has not been fixed to the pcb board as on my friend's micro. Could this omission by Acorn have anything to do with our troubles? – *James Sweeney, Walsall, Staffs.*



● **You do not say what values the resistors are. Refer to page 505 of the User Guide and you will see that Vref has a supply impedance of 2K5.**

Therefore if the parallel combination of all your thermistors approaches this value it will start to "drag down" the Vref value. This would affect the readings on all the channels.

The answer is to take each thermistor to +5 volts through a suitably valued series resistor.

Drive mod

We have a dual floppy 5¼in disc drive which has given excellent service in use with a 32k Commodore Pet.

The unit is a Computhink double disc drive and Model DSK 400 KP2.

Could you please advise me on what modifications and parts would be required to enable it to be compatible with BBC Model B? – *A. Murray, Senior Lecturer in Department of Business Studies, Motherwell College, Lanarkshire.*

● **The only way to use a Pet disc drive with the BBC Micro is to get an IEEE interface. However you will then need to use the IEEE filing commands.**

Also your discs will be unreadable by anyone with a normal disc system and you will not be able to use commercial software supplied on disc.

Finally an IEEE interface will cost you more than a new set of disc drives anyway.

The Syscon 6, described in Hardware Review this month should interest you.

IF you have a technical query for this page, send it to Mike Cook, *The Micro User*, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.

Letters on other subjects should be sent, as usual, to Micromail, which this month starts on Page 153.

IS KEYBOARDING TURNING YOU INTO A 'MICRO MONSTER'?

Let's face it, your BBC Micro is a demanding creature. Powerful it may be, but using the keyboard is probably a lot harder on *YOUR* system than you expected — and it's all because you're forced to 'hunt and peck' amongst 74 keys, on a keyboard that's a hundred years old!

It's no wonder you feel like the many-headed hydra! With your eyes being torn from document to keyboard, then to the screen for checking, and back again. Errors and bugs are bound to creep in.

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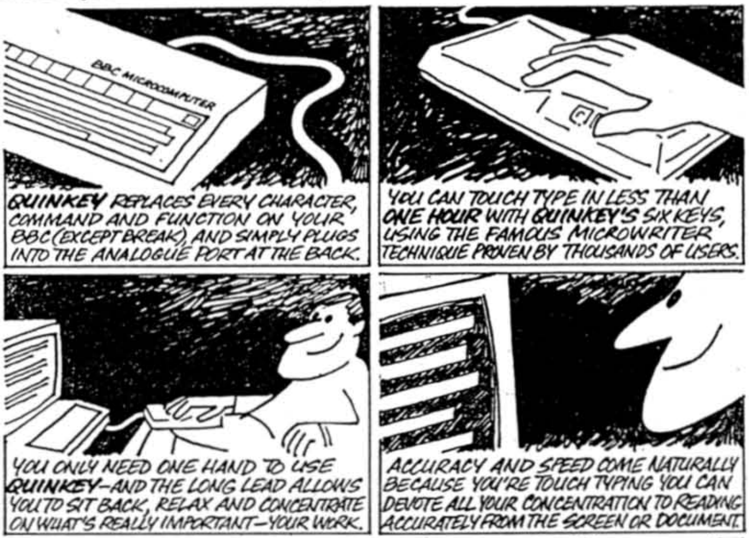
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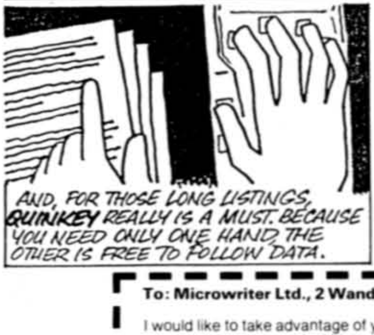
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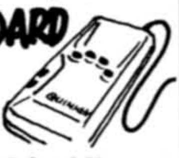

Five keys (plus control key) pressed in easily remembered combinations, give all inputs except Break. Can be used in conjunction with BBC keyboard or as entire replacement.

2 QUINKEY INTERFACE

Four-channel connector for up to four Quinkeys.★

3 SELF-TEACH GUIDE

Contains everything you need to know. Instantly learned, simple mnemonics based on widely used technique of Microwriting ensure you're touch-typing in under an hour.

4 PROG & WP SOFTWARE

Supplied on cassette (User Guide shows how to transfer to disk).

PROG merges easily with applications programs. WP enables Quinkey to be used with word processing packages such as Wordwise, View and Edword.

TECH SPEC — When invoked using CHAIN "WP" or CHAIN "PROG", loads at the current PAGE value and moves PAGE up by 768 bytes. No zero-page locations required. Interrupt service vector IRQ2V, correctly chained.

TESTED COMPATIBILITY — BBC model "B" OS E.I BASIC I or BASIC II (except when using INKEY with negative argument), DFS 0.90. View A1.4, Wordwise 1.17, Edword.

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NEW 16k EPROM

***HEX**, Is a full HEX dump, displaying 8 bytes of HEX and ASCII equivalent per line. A status line shows the current address and the byte at this address in:- HEX, ASCII, Decimal and either the binary, basic token or assembler mnemonic. Forward and reverse scrolling of the display at normal and high speeds is a feature, as is a full on screen memory editing facility which allows inputs in either hexadecimal, ASCII characters or assembler mnemonics.

***MON**, Serves the same function as *HEX, but the display is in disassembled opcodes, rather than *HEX. The editing and scrolling facilties are the same as for *HEX. An additional feature of *MON is the ability to directly follow JSR's, branch's etc.

***DEBUG**, A full featured program debugging aid, allowing the programmer to see the most intimate details of the program under examination. Features, variable speed, single stepping, breakpoints, continuously updated disassembler, selective HEX dumps (up to 6) plus current stack, all continuously displayed on screen, plus many other features.

***DISCED**, A comprehensive disc sector editor enabling any sector of a disc to be read, inspected, edited and written back. It will work with any 40, 80 or dual formatted single density disc.

***DGET**, Searches a disc for all occurances of a string or group of bytes.

***REL**, Enables machine code to be easily moved around in memory, automatically adjusting JSR's, JMP's etc.

***SLOW**, This command causes the entire computer to slow down to any variable speed between 1 and 255. This can allow the in depth study of graphic's methods etc.

***EDIT**, A dynamic basic screen editor, cursor controlled with full forward/reverse scrolling of listing, incorporating insert/delete lines, insert/overwrite characters, enter line from any position after editing.

"No need to Sweat!
Let me be your slave."

***REF**, Produces a cross-reference listing of the current basic program. All variable names are listed (WITHOUT HAVING TO RUN THE PROGRAM!) in alphabetical order followed by the line numbers on which they are referenced. Numeric items can also be crossed referenced if desired.

***SORT**, A built in sort routine allowing any single dimension array, be it integer, real or string, to be sorted.

BASIC COMMAND LIST:-
*PROG, *BAD, *EXTEND, *PACK, *SORT, *PAGE, *ENVELOPE, *FIND, *REPLACE, *XREF, *TRON, *TROFF, *CHAR, *EDIT, *EDKEY.

MACHINE CODE COMMAND LIST:-
*MCODE, *MOVE, *CROM, *SLOW, *GET, *PHEX, *GO, *MON, *HEX, *SPACE, *DGET, *DISCED, *DIS, *DEBUG, *CRC, *REL.

Designed with the serious programmer in mind, a 16K Eprom packed with a multitude of programmer friendly utilities, as with all SLAVE'S, SLAVE is instantly available and will obey an extensive range of commands. So why not invest in more muscle for your BEEB, and get some help with the heavy work!!! SLAVE has over 30 comprehensive machine code and basic tools.

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Bread-and-butter French – and well worth its salt

IN the current climate of educational computerthink, it's not surprising that most commercial foreign-language packages in some way aspire to 'teaching without tears'. The emphasis these days is firmly on having fun – a key word in language-learning blurb.

On the other hand, Dean Associates' **French Revision** – as the unimaginative title implies – makes no concession to gimmick. It involves no new revolutionary or effortless method, no glossy spruced-up system. It's a workaday bread-and-butter package for CSE, O Level and 16 plus. As such, it's well worth its salt.

Using nothing more sophisticated than the well-tried method of filling in blanks in French sentences and a rudimentary scoring system, the program covers a range of grammatical problems encountered in school French without any attempt to disguise the fact that grammar is problematic and that, when all is said and done, it can only be properly dealt with head-on.

So with a refreshingly traditional approach both in the comprehensive documentation and on the menu screens, the author of the package unashamedly uses language to talk about language.

He's not scared of phrases like "conjunctive accusative pronouns" or "partitive negative articles". Not that the user need be bothered with such terms in order to benefit from the program. But he or she won't get far with the more advanced exercises unless there has been some genuine understanding of the concept involved. And in my book, that is as it should be.

There are four levels – called grades – to choose from, sold separately on cassette, or bundled together on two discs. Grade D – the lowest – deals with nouns, adjectives and simple tenses.

Grade A – the highest – touches on some of the subtleties of conditional clauses, present participles, and the like.

Within each grade there are groups of exercises of increasing difficulty. Tests begin with two or more examples showing the format of a problem, and the sentences to be completed are then presented in random order.

With a good score in any group of sentences, you're prompted to progress to the next group – otherwise you're obliged to do them again, though Break returns you to the main menu at any time.

Average O Level candidates will find many hours of work – and perhaps, despite everything, even some fun – in this methodical program. Teachers can confidently recommend it to their pupils taking exams for CSE and above.

Gabriel Jacobs

DONT LET 'EM TAKE THE PSI OUT OF YOU

MIRRORSOFT
IVAN BERG SOFTWARE
Professor Hans Eysenck & Doctor Glenn Wilson
KNOW YOUR OWN PERSONALITY
Home Discovery Series
MIRRORSOFT
IVAN BERG SOFTWARE
HANS J EYSENCK AND CARL SARGENT
Know your own PSI-Q
Do you have Psychic Powers?
Home Discovery Series

IF I was to begin by pointing out that *real* psychological tests are not available to the general public, this would tell you something about **Know Your Own Personality.**

Fortunately, Eysenck and Wilson quite honestly point out that the scores are "suggestive rather than definitive; they are approximate, rather than precise and accurate ... we hope they will serve to amuse and stimulate you".

So, was I amused and/or stimulated? In true psychologist's fashion, I can honestly answer, "Yes and no".

Waiting for the tape to load was about as stimulating as an undertaker's convention. The program takes a few minutes, and then questions are loaded in batches of 70. Each of the three tests contains 210 questions so I made several cups of coffee while I tested myself.

On the other hand, I found some of the questions quite amusing. For example, "Are you careful to swim between the lifesaver's flags at the beach?" is hard to take seriously if like me you can't swim.

In addition to allowing you to test your own personality the notes also suggest some other uses for the program. For example, answer the questions as you think your spouse might and compare the results with your spouse's actual results.

I've known games like this to ruin marriages, particularly with questions like: "Would you consider going to a wife swapping party?" so be warned.

The results are presented in bar-chart form and you can opt for comments to be made on your scores. These remind me a little of newspaper astrological predictions – general enough to be right some of the time but occasionally completely wrong. For example, my wife was more than a little amused to see me described as "enjoying all kinds of physical activity".

You can save the results for future reference and print them out if you have a suitable printer.

If you're the sort of person who enjoys answering questionnaires, you and your friends could well derive some fun from

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this package. However if you score as high as me on impatience scales then make sure you pay the extra £3 for the disc version.

Know Your Own Psi-Q begins with a quiz to assess your "psychic inclinations, awareness and possible potential". I don't score very highly on this, but I'm prepared to keep my scientific mind open on the general question of psychic powers.

To help you get in the right frame of mind, the main menu offers a relaxation option which you should choose before you start the guessing games. You begin by inputting your pulse rate, and the machine then bleeps at that rate.

The bleeps gradually get slower, the claim being that this "... induces your body to reduce its pulse rate in line with the bleeps".

The mechanism by which this induction occurs isn't really explained, and I got the distinct inpression as I gazed at the screen for three minutes that someone was taking the psi out of me.

Two of the games offer the choice between testing for clairvoyance or precognition. If you choose to be clairvoyant, the micro makes its decisions and then you attempt to match them. In precognition, you attempt to predict which decisions the micro will make before it makes them.

I'm not sure how you could separate successful precognition from possible psychokinesis. I mean, maybe you're not predicting the outcomes, maybe you're determining them. Of course, either is a good trick if you can do it.

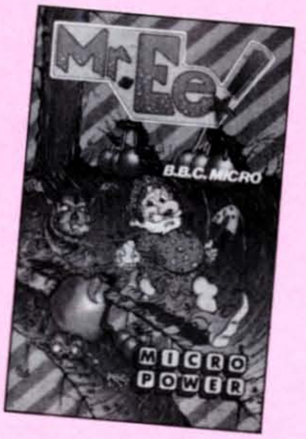
One option allows you to keep records of your ability over time which means that you could – for example – see whether psychic ability fluctuates with biorhythms.

Personally, I'm investigating the effects of different drinks on psychic ability. So far, gin and tonic doesn't seem to be working but I'm slowly increasing the dosage. That's dedication for you.

Overall, then, these packages do offer something a little out of the ordinary and may well amuse and stimulate you. Don't take them too seriously though, otherwise you might become a psychologist – and look where it got me.

Cliff McKnight

Wizard version



ORIGINAL ideas that are sure-fire sellers are few and far between in the software industry and it is for this reason that companies have a tendency to produce micro versions of the arcade favourites.

Unfortunately these invariably tend to be second rate copies that have none of the original sparkle. Micro Power have just released a version of that much copied classic, Mr Do. Written by Mr Killer Gorilla himself – Adrian Stephens – **Mr Ee** is more original than the original.

For those of you who are unfamiliar with the game – there must be someone who has never played Mr Do – Mr Ee is a wizard. He passes the time by creating tunnels through the earth collecting cherries – some subterranean variety.

Collect all the cherries on one screen and you proceed to the next level. You always know which screen you are on because the few tunnels which are always present at the start of a screen are laid out in the shape of the screen number.

Most of Mr Ee's time is taken up with cherry harvesting, the rest is spent avoiding the resident monsters. These can be dispatched by sending an overgrown Granny Smith down a tunnel annihilating the following baddies.

If you have ever wondered why wizards have crystal balls, then play this game and all will be revealed. I had always believed that wizards spent their time gazing into them, pondering the mysteries of the universe. Not this chap. With a googlie that Ian Botham would be proud of Mr Ee sends it crashing headlong into an adversary at the push of a button.

The word "EXTRA" is printed at the top of the screen. Occasionally one of the letters will join in the attack upon Mr Ee. Don't try to hit it with an apple because it doesn't work – these chaps have to be taken out with the old crystal ball.

Get the lot and you're in for a hefty bonus.

The only thing that marred the game slightly was the lack of a high score table. Despite this omission I would recommend it to anyone. It is one of the best conversions I have seen to date.

Jon Revis

WHAT CAN IT DO? WELL QUITE A LOT

HOW many times upon showing someone your micro have you been asked: "Well, what can it do that's useful then?" If you are at a loss for an answer then show them **Computers, Information, Awareness.**

This package – from Pitmansoft – demonstrates a number of excellent business application programs each of which shows something of the micro's versatility as a commercial tool.

Top Ten is a simplified record shop utility which records sales and money transactions as well as keeping a check on stock for re-ordering.

Online is a model of a typical reference library data bank from which one can look up a subject and obtain a list of source material which contain references to that topic.

Swiftair is a model of a typical airline company's seat booking procedure and comes with partially filled aircraft and passenger lists.

Wages is based upon a typical utility which could be used by an accounts office for making out wage slips for employees.

Words is a rather poor demonstration of a word processor.

Crime on the other hand is a clever program which simulates the type of database which could be used at a high security police headquarters. To obtain information from the database one has to enter a password, but the depth of information retrieval depends upon the security clearance given to the password.

The clever bit is that all entries into the system are recorded along with details of the enquiry and the only people who can access all the information in the micro – and details of access – are those with the top security password 999. Altogether, it is probably worth buying the disc for this program alone.

All the programs are interactive and more complex than my simple descriptions and give some idea of how information collection, analysis, retrieval and display of data can be manipulated by a micro.

The disc is part of a package which includes a student reader and teacher's handbook. The quality is such that the commercial studies department at my own school is contemplating buying the package. There can be no higher praise.

John Daddy

Er-Bert's busy, but noisy

IN **Er-Bert** from Microbyte you have to change the colour of squares around you by jumping on them.

All the time however, the local hit-squad consisting of Coily the snake and Boris the gorilla try to vapourise you out of existence. Cascading balls make life even more difficult than it already is.

If things get really hot you can move yourself to the top of the grid via one of two transporter discs. These can be used for escaping from your enemies.

Another delightful way of escaping is by use of a rota hat in which Er-Bert looks rather smart. With this Er-Bert can lift or lower himself two rows.

You can score double points by stealing Boris's banana. Lovable Boris will not hesitate to zap you with his big hairy arms if you do, but you can drop the banana and make good your escape.

There are 10 levels each with four different screens and a fast or slow play option. The keys take a little time to master and at first I kept falling off the grid and losing a life for no apparent reason.

The graphics are extremely good but the sound becomes a little tedious after a short time and as there is no sound-off button, I found myself stuffing up the speaker with tissues.

Er-Bert is a faithful replica of the original Q-Man and is good value for money.

Simon Rubins

MICROBYTE SOFTWARE
'ER*BERT
FOR THE BBC 32K

Pictures out of your hat

WHEN you can drag yourself away from Elite back to some serious programming of your own, you will find **Artsystematic** from Technation a very useful variation on the standard line-circle-fill graphics program.

There are the usual features – solid/dotted lines, filled/unfilled circles, rectangles and ellipses, freehand drawing, colour change, shape fill and text insertion.

All are keyboard run only, but besides that there are a number of nice routines which help towards fulfilling the aim of the program's designer, Alex Blok.

This aim is to enable the programmer to produce pictures in any mode, store them and then to be able to recall them in any program. You could create a slide show sequence to accompany a lesson or a business lecture, for example. Graphs and charts are easy to construct using this program.

Alternatively, you could run a Ceefax/Oracle style newsletter using Mode 7 screens to convey information – each screen in this mode only uses 1k and so one side of a 40 track disc can store 100 screens.

The pictures you have created can be called manually, stepping forward or backwards through the stored sequences just like a photo slide carousel, or automatically with a settable delay that is giving me some great ideas for open day presentations.

Of course the higher the screen resolution, the lower the number of screens per disc, down to only five for Modes 0-2.

For doing the actual drawings there are helpful facilities like 'delete previous line', a variable background grid, 'rubberband' to show the position of a line before committing oneself, cursor position coordinate information and so on.

I particularly like the master/slave cursors which zoom around superimposed a lot of the time but separate to define line ends, circle and ellipse radii or rectangle diagonals.

The cursors' lock is a great idea, fixing the distance apart of the two cursors. By moving just the master it becomes possible to draw sets of parallel lines, repeated circles or rectangles anywhere on the screen.

There are also shading techniques available and a perspective guide routine. The program itself is not fantastically user friendly – as the manual admits – because it uses most of the available memory.

That is no hardship because the procedures are quite easy to get the hang of and the manual is quite comprehensive – if somewhat erratic in its spelling.

So altogether the designer and his friends have put together a package that builds upon the bog-standard graphic drawing package to make a very useful little item for display and demonstration purposes.

Terry Hallard

No stick – no joy

STAR Warp from Superior Software was a great disappointment. But for once this is not solely the fault of the game.

SUPERIOR SOFTWARE
FOR THE 32K BBC MODEL B
STAR WARP

Let me explain.

The object is to defend your homeworld against alien attack. This is of course just an excuse to get you up in a spaceship zapping aliens.

As the game starts, a pair of sliding doors open to reveal the sector of space through which you are speeding. Alien spacecraft appear, darting around the screen and firing an occasional energy bolt in your direction. Every time a bolt hits you, a level is knocked off your defence screen.

Your task is to knock out as many ships and bolts as possible before your screen is destroyed. This is done by centring them in the cross-hairs of your laser before zapping them.

Below the viewscreen a dis-

→

Heading for the last round-up

THE main educational purpose of **Round-Up** from Tynesoft lies in the practicing of rounding up to the next multiple of 10, so that 27 becomes 30 and so on.

A fair enough idea, perhaps, but I am less than convinced about the way it's then implemented.

It centres around a maze with a little figure moving around trying to collect money by passing guards – no, I didn't see the link either – who are dotted around the maze. In order to successfully move on, an addition or subtraction question, shown in the centre of the screen, has to be answered.

Three answers are illuminated in sequence. The child selects an answer by pressing the spacebar when the desired answer is illuminated.

An incorrect answer rather abruptly ends the game – no three lives here – and I question the educational value of this kind of failure. I personally like those programs which children are forced to succeed at, rather than actually being told they have failed.

Several children found the maze had no obvious destination, and they also seemed to be bored a little too quickly for it to be considered a worthwhile buy.

It is a fair program and could probably be exactly what some schools/parents are looking for but it won't be seeing much work in my school.

Phil Tayler

From Page 83

play shows the state of your defence, laser temperature, score, and screen number.

As the game progresses you find yourself whizzing the laser sights all over the place in an effort to keep up with the enemy, and this is where the program falls down.

The laser is controlled by the usual keys: Z and X for left and right, * and ? for up and down. Try as I might, I just couldn't get enough accuracy using these keys. The game can be played with a joystick if you have one and for my money this would be the only way to be accurate enough.

There are a couple of other minor points that turn me against the game. Firing is done with Return, which has to be hit with the little finger, and I find this awkward. It's much easier with the thumb. Also as the game progresses, little new happens. It gets harder, but that's about all.

Sound and graphics are OK, although not spectacular. Overall, if you have a joystick you may quite enjoy the game. If you haven't – be warned. You'll be fed up after one evening.

James Bibby

With big databases in mind..

DATAGEM IS A ROM-based database system requiring a BBC Model B, operating system 1.2 or greater, and one to four disc drives.

Gemini state that the maximum capacity of the system is 10mbytes per file, 5,110 records per file, 6,143 bytes and 62 fields per record, so one is dealing with potentially quite a large database system.

I found the instructions as to how to fit the carrier board were easy to follow and the documentation in general was excellent. Information is included on how Datagem can be interfaced with the View and Wordwise word-processing ROMs.

When setting up a new file, the user is presented on the screen with a representation of the top left hand corner of a card. Think of this as a record card in a manual system whose size can be varied up to 119 rows and columns.

It is on this card that the user will plan the layout of the fields. As data is entered the cursor stays in the centre of the screen and the card moves around from field to field in a fascinating manner.

To speed up data entry, default values can be set up where wanted, the user only overwriting the default entry when necessary.

There are good facilities for altering the layout and colours of the record card after it has been set up but if something radical is to be done, such as wanting a new field to be included in each record, then quite a bit of work can be involved.

Each field on the existing records has to be spooled individually to disc and then copied back into the new record format. This can be a rather lengthy method but it has the merit of affording great flexibility in how records can be altered.

In addition to the format used for displaying the records on the screen, other formats for printing out some or all of the fields can be stored on disc for future use.

The print formats can be extensive so that they could comprise the text of a letter with the name and address fields from the records being incorporated at the appropriate positions.

Searches for specific records can be performed using search criteria based on any fields or parts of any fields. Complex search criteria can be constructed using logical operators.

Up to eight different lists of search results can be maintained and the user can move freely from one list to the other for purposes such as printing.

The results from several searches can be combined in a wide variety of ways such as using the equivalent of AND or OR rules.

Sorting can be performed using any field to arrange the data in either ascending or descending order. So far as I could see, the manual makes no reference to the results of multiple sorts – for example could I have a list of individuals sorted into descending age order and within that in ascending alphabetical order of their surnames?

I performed a limited test on a small number of records and this type of sorting does seem to be possible through using consecutive sorts. If this capabilty were important to your application, however, it might be worthwhile checking this point with Gemini.

Very powerful calculation facilities are built into Datagem. As a simple example, if a person's birthday were entered into one field then another field could be set to calculate the person's age by subtracting the date of birth from the current date.

As mentioned at the start of this review, Datagem has impressive specifications in terms of file size. Up to four disc drives are supported and large files can be spread over the four drives.

Depending on the type of drive used, this can permit large amounts of data to be held. My examination of this database was, however performed on

Simulation, not stimulation

KON-TIKI is a program that simulates the voyage undertaken by Thor Heyerdahl in 1947 to show that it was possible that early man had travelled from the coast of Peru to the Polynesian Islands by balsa raft.

Available as a disc or tape from Golem it comes with a booklet giving background information and program notes.

The basic idea involves plotting on a base map after the micro has updated the location.

Interaction with the micro is limited and is restricted to inputting a steering direction. At this point it is important to check the wind direction and to allow for the prevailing current.

There is only one screen used during the main program and this shows basic information such as the number of days at sea, the date, total distance travelled, wind direction, sightings of creatures and birds and the distance travelled on the previous day.

It is suggested a log book is kept during the journey as well as updating the positions on copies of the base maps provided.

Before attempting the program it is suggested that the children should be familiar with coordinates for latitude and longitude, that they understand wind direction and have a broad knowledge of ocean currents in the Pacific Ocean.

Fifteen minutes are allowed for the journey and after this time the data is saved on tape or disc. This will allow various groups to use the program in a given time period and the journeys may be continued at a later date.

On the whole this is a tidy program that succeeds in achieving its rather limited aim. It does not really make a great deal of use of the micro's capabilities and is obviously only acting as a glorified calculator.

There are a number of other avenues that could have been incorporated such as the logistics of the expedition and this would have allowed a wider use of the program as well as giving better value for money.

My major area of criticism is in the presentation of the booklet. It contains much useful material that would be improved by typesetting, better cartography and much better printing of the base maps that must be copied.

Voyages of this type consist of many days of boredom in only slowly changing conditions. If this was a prime aim of the simulation it succeeds very well. However, it does not make for very stimulating learning.

Norman Parr

small files and I have no evidence as to the speed of response that can be obtained with large files.

To sum up, a very impressive piece of software which should find wide application where large databases are needed.

Ken Garrett

Fight for survivors

SUPERIOR SOFTWARE
FOR THE 32K BBC MODEL B
AIRLIFT

AS one of the army's ace helicopter pilots you have been volunteered for **Airlift**, Superior Software's highly dangerous mercy mission.

Enemy tanks are attacking installations on the front lines and it is up to you to rescue as many survivors as possible and deliver them to a Red Cross hostel.

When travelling at high speed your chopper fires missiles horizontally and when travelling slowly it drops bombs.

As you patrol the battlefield you may bomb the tanks before they shell the buildings and collect the odd point or two in the process.

Once a building has been attacked you must land the chopper near to the ruins, still fighting off the tanks, and wait for the survivors to leave what shelter they had found and climb aboard.

The scrolling of the landscape is very smooth, with background and foreground objects travelling at different rates, giving depth of field and a 3D effect.

As with many of Superior's games it is attention to detail that is the program's strong point. The survivors of Airlift are an excellent example.

While being no more than very tiny stick men they have been animated in such a way as to express character. When running to the helicopter they will beckon to their comrades, pointing and waving in your direction.

Once the helicopter will take no more passengers it is time to head back to the Red Cross hostel, touch down gently, and collect vast numbers of points.

The tanks themselves provide few problems, and once the gentle landing has been mastered the game is not too taxing. However as your score begins to approach the 20,000 mark a new adversary appears on the screen, the auto-gyro.

These little babies are quick, manoeuvreable and deadly, and from this point onwards you can forget the tanks because you have got real problems.

The game combines characteristics of both Defender and Rocket Raid to produce maybe not an original but certainly a very well written and enjoyable game.

Jon Revis

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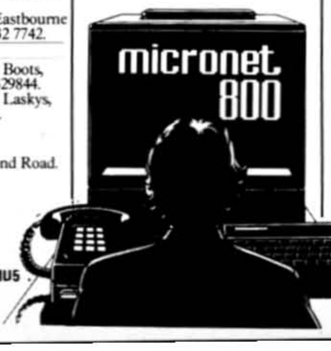

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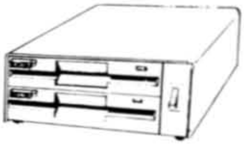

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Summon up some spritely characters

THIS month we're going to look at software sprites in Mode 2. Sprites are large characters (sometimes multi-coloured) which can be moved around the screen by very simple commands.

They are normally controlled by hardware, but with clever programming techniques they can be simulated with software routines.

All the user has to define is the size of the sprite, its position and the data that corresponds to its shape and colour.

Hardware sprites offer automatic collision detections and have a priority system. They also take up virtually no processing time – in other words, they're very fast. And for most applications where they're used – such as games – speed is essential.

Since sprites are separate from the normal screen display, no background data is lost when they pass over other objects.

They don't even destroy their own kind.

The BBC Micro, unfortunately, does not have any hardware sprites. Programmers have to imitate them using software. The result can never be as good as the real thing, but is suitable for most purposes.

The main difference is speed. Software sprites take a lot of processing time in updating the video RAM. Another problem is that the display may flicker, depending upon when the sprite is displayed and how large it is.

To explain this further we must look at the way television sets and monitors display pictures.

Every fiftieth of a second the screen display is refreshed (updated). The beam of electrons that creates the picture, called the raster, scans across the screen displaying the picture from left to right, working its way down the screen.

When it reaches the bottom right corner it moves back to the top left and starts all over again – one fiftieth of a second later.

The time taken to move from the bottom right to the top left is known as the re-trace period.

The best time to reposition a software sprite is during the re-trace period, when the screen is not being updated. This is easier said than done because the re-trace period is very short.

If you update a software sprite at the same time as the raster displays it the screen will flicker.

For example, if you're half way through updating a sprite and the raster reaches the point on the screen where the sprite is to be displayed, only half of it will appear – the other half hasn't been finished yet.

If this is repeated 50 times a second a horrible flashing character will result – I'm sure you've seen examples of this.

Fortunately we can wait for the start of the re-trace period by issuing a *FX 19 command (OSBYTE 19).

The usual procedure used to update a software sprite is to execute a *FX 19 command, erase the sprite and redisplay it at its new position. This will reduce the flicker. In fact, the display and delete routines are the same. This is because EOR has been used to display the sprites – see the March issue of *The Micro User* for more details about EOR.

If, however, a large sprite is being moved near the top of the screen, flickering will occur even if the above

```
   10 REM Column poke routine
   20 REM By Kevin Edwards
   30 screen=&3100
   40 data=&8000
   60 height=128
   70 MODE 2
   80 HIMEM=&2E00
   90 FORL=0TO2STEP2:P%=HIMEM
  100 [OPTL
  110 .start LDA#height:STA&75
  130 LDA#data MOD 256:STA&72
  140 LDA#data DIV 256:STA&73
  150 LDA#screen MOD 256:STA&76
  160 LDA#screen DIV 256:STA&77
  170 .main_part LDA&76:STA&70
  180 LDA&77:STA&71
  190 LDY#0:LDX&75
  200 .column LDA(&70),Y:EOR(&72),Y
  210 .onto_screen STA(&70),Y
  220 .increment_data INC&72:BNE no_h
igh
  230 INC&73
  240 .no_high LDA&70:AND#7
  250 CMP#7:BNE not_at_bottom
  260 CLC:LDA&70:ADC#&79:STA&70
  270 LDA&71:ADC#2:STA&71
  280 JMP check_end_of_column
  290 .not_at_bottom INC&70
  300 .check_end_of_column DEX:BNE co
lumn
  340 RTS
  350 ]NEXT
  360 CALL start
```

Program I

Line No.	
30	Defines the screen address for the top of the column.
40	Defines the start address for the data which is stored in the column.
60	Defines the height of the column (in pixels).
80-100	Enter the assembler and assemble the code at &2E00.
110-160	Store the parameters in zero page.
170-180	Copy the column start address from &76,&77 into &70,&71 – this is used in later programs.
190	Load the X register with the column height then load the offset register Y (for the indirect addressing) with 0 – the offset is always left at 0.
200-210	Read the screen byte, EOR it with the data byte and store it back in the video RAM.
220-230	Increment the data pointer by one.
240-290	Move the screen pointer down one pixel – see last month's article.
300	Decrement the height register, X, and repeat the previous steps if the column isn't complete.
340	Back to Basic.
350	Exit assembler.
360	Automatically tests the routine.

Description of Program I

Part four

HOW TO WRITE MACHINE CODE GAMES

By KEVIN EDWARDS

procedure is followed. This will be because the raster has completed the retrace and is now displaying the top of the new screen where the large sprite is still being updated – it takes longer to display a large sprite than a small one.

One way to avoid this is to execute *FX 19, wait a while, and then update the sprite. The time delay should be long enough to allow the raster to pass the base of the sprite. Now it is safe to update the screen memory.

As you can see, it's very awkward to produce fast software sprites without flicker. Consider the case where you have 10 sprites moving around the screen. If you used *FX 19 before you updated each one the program would slow down. So the only way to speed it up is to miss a few *FX 19s. The obvious result is flicker. You have to trade off speed versus flicker.

Now we've got that off our chests we'll get down to implementing sprites on the BBC Micro.

Last month we saw how a byte could be moved vertically. One program moved the byte up the screen and the other moved it down. In this article we are only interested in moving a byte down the screen.

The first program, Program I, allows a set of data to be displayed vertically down the screen. The method used to move to the next byte down the screen was described last month.

So far we've never used indirect addressing. Program I uses post-indexed indirect addressing to read a byte from the video RAM, EOR it with the data byte and write it to the screen again. Remember, EORing the screen and data bytes allows us to use one routine for displaying and deleting a sprite.

Indirect addressing works like absolute addressing except that the action address is given by the contents of two consecutive zero page locations which are specified.

The apparently "missing" lines in Program I have been filled in Program II, which allows a sprite of any size to be displayed anywhere on the screen.

The routine starts at the top left corner of a sprite and works its way down, one pixel at a time. On its way it copies a data byte into the screen address being accessed, thus displaying part of the sprite.

When it reaches the base of the sprite it starts again at the top, this time to the right of the previous start address.

```
   10 REM Simple, slow sprite routine
   20 REM By Kevin Edwards
   30 screen=&3100
   40 data=&8000
   50 width=10
   60 height=64
   70 MODE 2
   80 HIMEM=&2E00
   90 FORL=0TO2STEP2:P%=HIMEM
  100 [OPTL
  110 .start LDA#height:STA&75
  120 LDA#width:STA&74
  130 LDA#data MOD 256:STA&72
  140 LDA#data DIV 256:STA&73
  150 LDA#screen MOD 256:STA&76
  160 LDA#screen DIV 256:STA&77
  170 .main_part LDA&76:STA&70
  180 LDA&77:STA&71
  190 LDY#0:LDX&75
  200 .column LDA(&70),Y:EOR(&72),Y
  210 .onto_screen STA(&70),Y
  220 .increment_data INC&72:BNE no_h
igh
  230 INC&73
  240 .no_high LDA&70:AND#7
  250 CMP#7:BNE not_at_bottom
  260 CLC:LDA&70:ADC#&79:STA&70
  270 LDA&71:ADC#2:STA&71
  280 JMP check_end_of_column
  290 .not_at_bottom INC&70
  300 .check_end_of_column DEX:BNE co
lumn
  310 CLC:LDA&76:ADC#8:STA&76:BNE tes
t_end_column
  320 INC&77
  330 .test_end_column DEC&74:BNE mai
n_part
  340 RTS
  350 ]NEXT
  360 CALL start
```

Program II

Program II is the same as Program I with the following additional lines:

50	Defines the width of the sprite (in paired pixels).
120	Copies the sprite's width into zero page.
310-320	Add 8 to the column's previous start address – this moves the column right by two pixels.
330	Tests to see if all of the columns have been displayed. Branch if they haven't.

Description of Program II

Remembering the top location of each column and adding 8 to it provides a simple method of finding the start address for the new column.

In other words, the column routine, Program I is repeated over and over again, with the start address 8 bytes further on in memory each time – two pixels to the right.

This means that the data for the sprite must be stored sequentially column by column. A data pointer keeps track of the data item being displayed – locations &72 and &73 point to the next byte to be displayed.

The dimensions of the sprite are defined in lines 50 and 60. The width corresponds to paired pixels, whereas the height corresponds to single pixels – remember each byte is two pixels wide and one pixel high.

Line 30 specifies the screen address for the top left corner of the sprite. This must be between &3000 and &7FFF – the start and end of the video RAM in Mode 2.

Line 40 defines the start address of the sprite data. This data corresponds to the shape and colour of the sprite.

Programs I, II and III display data from &8000 onwards. &8000 is the start of the Basic ROM and so produces random shapes and colours on the screen.

Program III uses the same techniques

→

HOW TO WRITE MACHINE CODE GAMES

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as Program II but in a more efficient way. The speed increase is about 30 per cent.

Software sprite routines tend to vary considerably, depending on the size and movement of the sprites used. Very fast routines are usually tailor made for the sprites being used. The sprite routines given (Programs II and III) are purely for general use.

The aim of them all is to be as fast and efficient on memory as possible. One way to speed them up is to locate the routine in zero page.

The 6502 can execute zero page programs quicker because addressing modes for zero page are quicker than absolute addressing. For example, INC &4000 takes longer to execute than INC &70. Although the time difference is small, when executed several hundred or thousand times it becomes significant.

Program IV uses a faster sprite routine to display a yellow face at the top of the screen.

Lines 50 and 60 inform the routine to display a sprite the same size as a character – 4 bytes by 8.

The problem with the sprite routines we've developed up to now is that they're not very user-friendly when it comes to specifying the position of the sprite.

At the moment you specify the screen location for the top left corner of the sprite. It would be much easier if you could specify the X and Y coordinates of the sprite and let a routine calculate the screen address for you.

The X axis consists of 80 columns

→

```
   10 REM Faster sprite routine
   20 REM By Kevin Edwards
   30 screen=&3100
   40 data=&8000
   50 width=20
   60 height=48
   70 MODE 2
   80 HIMEM=&2E00
   90 FORL=0TO2STEP2:P%=HIMEM
  100 [OPTL
  110 .start LDA#height:STA&75:STA&78
  120 LDA#width:STA&74
  130 LDA#data MOD 256:STAcolumn+1
  140 LDA#data DIV 256:STAcolumn+2
  150 LDA#screen MOD 256:STA&76
  160 LDA#screen DIV 256:STA&77
  170 .user_entry LDX#0
  180 .main_part LDA&76:AND#&F8:STA&7
0
  190 LDA&77:STA&71
  200 LDA&76:AND#7:TAY
  210 .column LDA&FFFF,X:EOR(&70),Y
  220 .onto_screen STA(&70),Y
  230 INX:BEQ inc_data_high
  240 .end_checks INY:CPX&78:BEQ end_
of_column
  250 CPY#8:BNE column
  260 LDA&70:ADC#&7F:STA&70
  270 LDA&71:ADC#2:STA&71
  280 LDY#0:BEQ column
  290 .inc_data_high INC column+2:JMP
 end_checks
  300 .end_of_column CLC:LDA&76:ADC#8
:STA&76:BCC no_high:INC&77
  310 .no_high CLC:LDA&78:ADC&75:STA&
78
  320 DEC&74:BNE main part
  330 RTS
  340 ]NEXT
  350 CALL start
```

Program III

Line No.	
30-60	Define the sprite parameters.
80-100	Enter assembler.
110-160	Copy sprite parameters into other parts of memory. Two of the bytes are stored within the program itself, and the others are put in zero page.
170	Data offset register = 0.
180-190	Copy column start address into &70,&71. The low byte being the top of the current character column (AND &F8).
200	Loads the offset register with the screen low byte ANDed with 7 – to get the offset from the top of the character column.
210-220	Read the data byte, EOR it with the screen byte and store it back in the video RAM.
230	Increments the data offset register. If the X register is zero, branch, so that the data pointer high byte can be incremented.
240	Increments the screen memory address offset register. Check if the end of the column has been reached. If it has, the branch is taken.
250	Checks to see if the start of the next character row column has been reached. Branch if it hasn't.
260-280	Add &280 to the screen address – to move down to the next character row.
290	Increments the data pointer high byte and continues with the rest of the column.
300	Adds eight to the column's start address – the top of it. This moves the start address right by two pixels.
310	Changes the data offset stop pointer so that the end of the next column will be terminated correctly.
320	Checks to see if all of the columns have been displayed. Branch if they haven't.
330	Exits to Basic.
340	Exits assembler.
350	Tests program.

Description of Program III

```
   10 REM Faster sprite routine
   20 REM By Kevin Edwards
   30 screen=&3100
   40 data=&C00
   50 width=4
   60 height=8
   70 MODE 2
   80 HIMEM=&2E00
   90 FORL=0TO2STEP2:P%=HIMEM
  100 [OPTL
  110 .start LDA#height:STA&75:STA&78
  120 LDA#width:STA&74
  130 LDA#data MOD 256:STAcolumn+1
  140 LDA#data DIV 256:STAcolumn+2
  150 LDA#screen MOD 256:STA&76
  160 LDA#screen DIV 256:STA&77
  170 .user_entry LDX#0
  180 .main_part LDA&76:AND#&F8:STA&7
0
  190 LDA&77:STA&71
  200 LDA&76:AND#7:TAY
  210 .column LDA&FFFF,X:EOR(&70),Y
  220 .onto_screen STA(&70),Y
  230 INX:BEQ inc_data_high
  240 .end_checks INY:CPX&78:BEQ end
of_column
  250 CPY#8:BNE column
  260 LDA&70:ADC#&7F:STA&70
  270 LDA&71:ADC#2:STA&71
  280 LDY#0:BEQ column
  290 .inc_data_high INC column+2:JMP
 end_checks
  300 .end_of_column CLC:LDA&76:ADC#8
:STA&76:BCC no_high:INC&77
  310 .no_high CLC:LDA&78:ADC&75:STA&
78
  320 DEC&74:BNE main_part
  330 RTS
  340 ]NEXT
  350 FORL%=0 TO 31
  360 READ L%?data
  370 NEXT
  380 CALL start
  390 DATA5,15,10,15,15,15,15,5
  400 DATA15,15,5,15,15,5,0,15
  410 DATA15,15,10,15,15,10,0,15
  420 DATA10,15,5,15,15,15,15,10
```

Program IV

Program IV is the same as Program III with the following additions or changes:

30-60	The sprite parameters have been changed to display a 8 by 4 byte sprite at location &3100 on the screen – the data starts at &C00.
350-370	Read and store the sprite data into page &C.
390-420	The sprite data – a smiling face.

Description of Program IV

Memory map for the sprite routines:

&70,&71	Screen address pointer.
&72,&73	Data pointer.
&74	Width of sprite, decremented each time a column is displayed.
&75	Height of the sprite in pixels.
&76,&77	Copy of the column start address – the top of the current column.

```
   10 REM Screen location calculator.
   20 REM Using screen X and Y co-ord
s.
   30 REM Origin - top left corner.
   40 REM Uses O.S for data tables.
   50 REM By Kevin Edwards
   60 MODE7:HIMEM=&7000
   70 FORL=0TO2STEP2:P%=HIMEM
   80 [OPTL
   90 .calc_loc LDA#&30:STA&81
  100 LDA#0:STA&82
  110 TYA:AND#7:STA&80
  120 TYA:LSRA:LSRA:LSRA:ASLA:TAY
  130 TXA:ASLA:ROL&82:ASLA:ROL&82
  140 ASLA:ROL&82
  150 ADC&80:ADC&C376,Y:STA&80
  160 LDA&82:ADC&81:ADC&C375,Y:STA&81
  170 RTS
  180 ]NEXT
  190 REPEAT
  200 INPUT''"Enter X co-ordinate",X%
  210 IF X%<0 OR X%>79 THEN VDU7:PRIN
T'"X must be in the range 0-79 !":GOT
O 200
  220 INPUT'"Enter Y co-ordinate",Y%
  230 IF Y%<0 OR Y%>255 THEN VDU7:PRI
NT'"Y must be in the range 0-255 !":G
OTO 220
  240 CALL calc_loc
  250 PRINT'"Location =&";~?&81*256+?
&80
  260 UNTIL 1=2
```

Program V

Line No.	
60-80	Enter assembler.
90	Stores Mode 2 screen start address high byte in &81.
100	Stores 0 in the workspace. This is used to accommodate any overflow that occurs when X is multiplied by 8.
110	Puts Y AND 7 into the screen address low byte.
120	Calculates (Y/8)*2. The result of Y/8 is multiplied by 2 to allow us to make use of the ROM multiplication table – this starts at &C375 and consists of 32 entries of an &280 multiplication table. Each entry in the table is stored in pairs – high byte then low byte.
130-140	Calculate X*8. The three most significant bits of the result are held in bits 0 to 2 of location &82 the workspace.
150	Adds the screen low byte to the result of X*8. Then adds the low byte of the &280 multiplication table to the result. This is then stored in location &80.
160	Adds the high byte of X*8 to the screen address high byte. Then adds the high byte of the &280 multiplication table and stores the result in location &81.
170	Back to Basic.
180	Exit assembler.
190-260	Accept valid input for two screen co-ordinates and print the result.

Description of Program V

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(0-79) and the Y axis has 256 rows (0-255) – see Figure I, page 74 in the February issue of *The Micro User*. If we use the top left corner as the origin we can use the following equation to calculate the screen location.

```
location=&3000+(X*8)+&280*(Y DIV 8)+(Y AND 7)
```

As you can see, it's quite a complex equation. The machine code equivalent is given in Program V.

When you RUN the program you'll be asked to enter the X and Y coordinates of the sprite's position – remember the origin is the top left corner of the screen. On entering these the screen address will be calculated and displayed.

On entry to the routine the X register holds the X coordinate of the sprite and the Y register contains its Y coordinate. These are passed to the routine by the resident integer variables X% and Y%.

So in your own machine code programs you would load the X and Y registers with the X and Y coordinates of the sprite and then JSRcalc_loc.

On exit, location &80 contains the low byte of the screen address and &81 contains the high byte of the screen address. It's as easy as that.

Program VI contains the screen location calculator and the sprite routine from Program III. It demonstrates how the two routines can be combined to move a multi-coloured sprite across the screen.

Now you've got two sprite routines I'm sure you'll be able to conjure up some stunning animation.

Next month's article will contain a full listing of a multi-coloured character definer. Until then, happy animation.

```
   10 REM Sprite demo
   20 REM By Kevin Edwards
   30 data=&C00
   40 width=4
   50 height=16
   60 MODE 2
   70 HIMEM=&2E00
   80 FORL=0TO2STEP2:P%=HIMEM
   90 [OPTL
  100 .sprite LDA#height:STA&75:STA&7
8
  110 LDA#width:STA&74
  120 LDA#data MOD 256:STAcolumn+1
  130 LDA#data DIV 256:STAcolumn+2
  140 .user_entry LDX#0
  150 .main_part LDA&76:AND#&F8:STA&7
0
  160 LDA&77:STA&71
  170 LDA&76:AND#7:TAY
  180 .column LDA&FFFF,X:EOR(&70),Y
  190 .onto_screen STA(&70),Y
  200 INX:BEQ inc_data_high
  210 .end_checks INY:CPX&78:BEQ end_
of_column
  220 CPY#8:BNE column
  230 LDA&70:ADC#&7F:STA&70
  240 LDA&71:ADC#2:STA&71
  250 LDY#0:BEQ column
  260 .inc_data_high INC column+2:JMP
 end_checks
  270 .end_of_column CLC:LDA&76:ADC#8
:STA&76:BCC no_high:INC&77
  280 .no_high CLC:LDA&78:ADC&75:STA&
78
  290 DEC&74:BNE main_part
  300 RTS
  310 .calc_loc LDA#&30:STA&81
  320 LDA#0:STA&82
  330 TYA:EOR#&FF:TAY:AND#7:STA&80
  340 TYA:LSRA:LSRA:LSRA:ASLA:TAY
  350 TXA:ASLA:ROL&82:ASLA:ROL&82
  360 ASLA:ROL&82
  370 ADC&80:ADC&C376,Y:STA&76
  380 LDA&82:ADC&81:ADC&C375,Y:STA&77
  390 RTS
  400 ]NEXT
  410 FORL%=0 TO 63
  420 READ L%?data
  430 NEXT
  440 Y%=100
  450 FORX%=0 TO 75
  460 CALLcalc_loc
  470 CALLsprite
  480 *FX19
  490 CALLcalc_loc
  500 CALLsprite
  510 Y%=Y%+2*(RND(3)-2)
  520 NEXT
  530 END
  540 REM Monster data
  550 DATA&3F,0,1,1,9,9,9,9
  560 DATA9,10,10,0,0,0,32,&33
  570 DATA0,&2A,3,6,&24,&24,12,4
  580 DATA8,12,12,8,8,8,8,&22
  590 DATA0,&15,3,9,&18,&18,12,8
  600 DATA4,12,12,4,4,4,4,&11
  610 DATA&3F,0,2,2,6,6,6,6
  620 DATA6,5,5,0,0,0,&10,&33
```

Program VI

Line No.	
30-50	Define the sprite's parameters.
70-90	Enter the assembler.
100-300	The main sprite routine – see Program III's description.
310-390	Screen location calculation routine. On entry X and Y contain the screen X and Y coordinates. In this example the origin is at the bottom left of the screen. Line 330 EORs the Y coordinate with &FF to change the origin from the top left corner to the bottom left corner.
410-430	Read and store the sprite's graphic data into page &C.
440	Defines the sprite's Y coordinate.
450	Causes the sprite's X coordinate to take all of the values between 0 and 75.
460-470	Calculate the screen address for the sprite and then display it.
480	Waits for the start of the retrace period.
490-500	Delete the old sprite.
510	Randomly changes the Y coordinate of the sprite.
520	Next X coordinate.
540-620	Sprite data.

Description of Program VI

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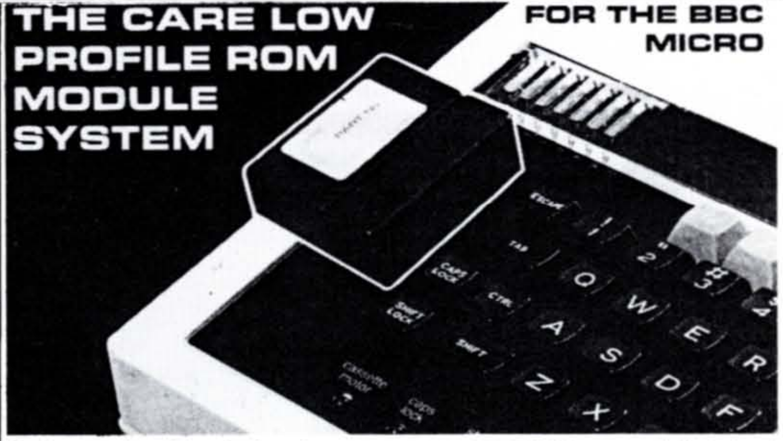

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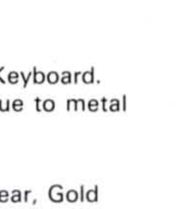

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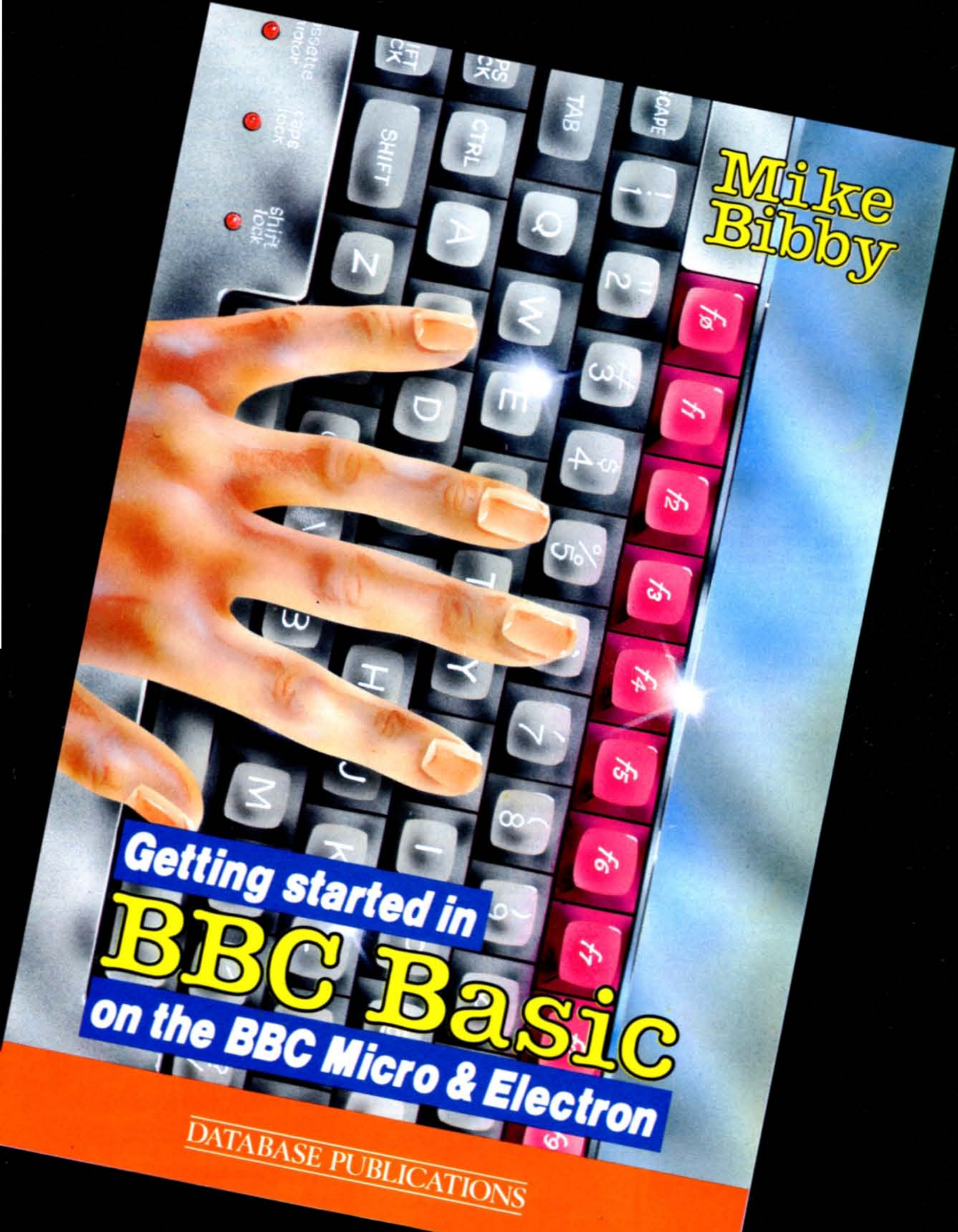

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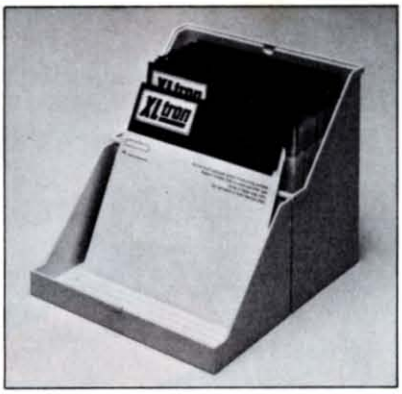

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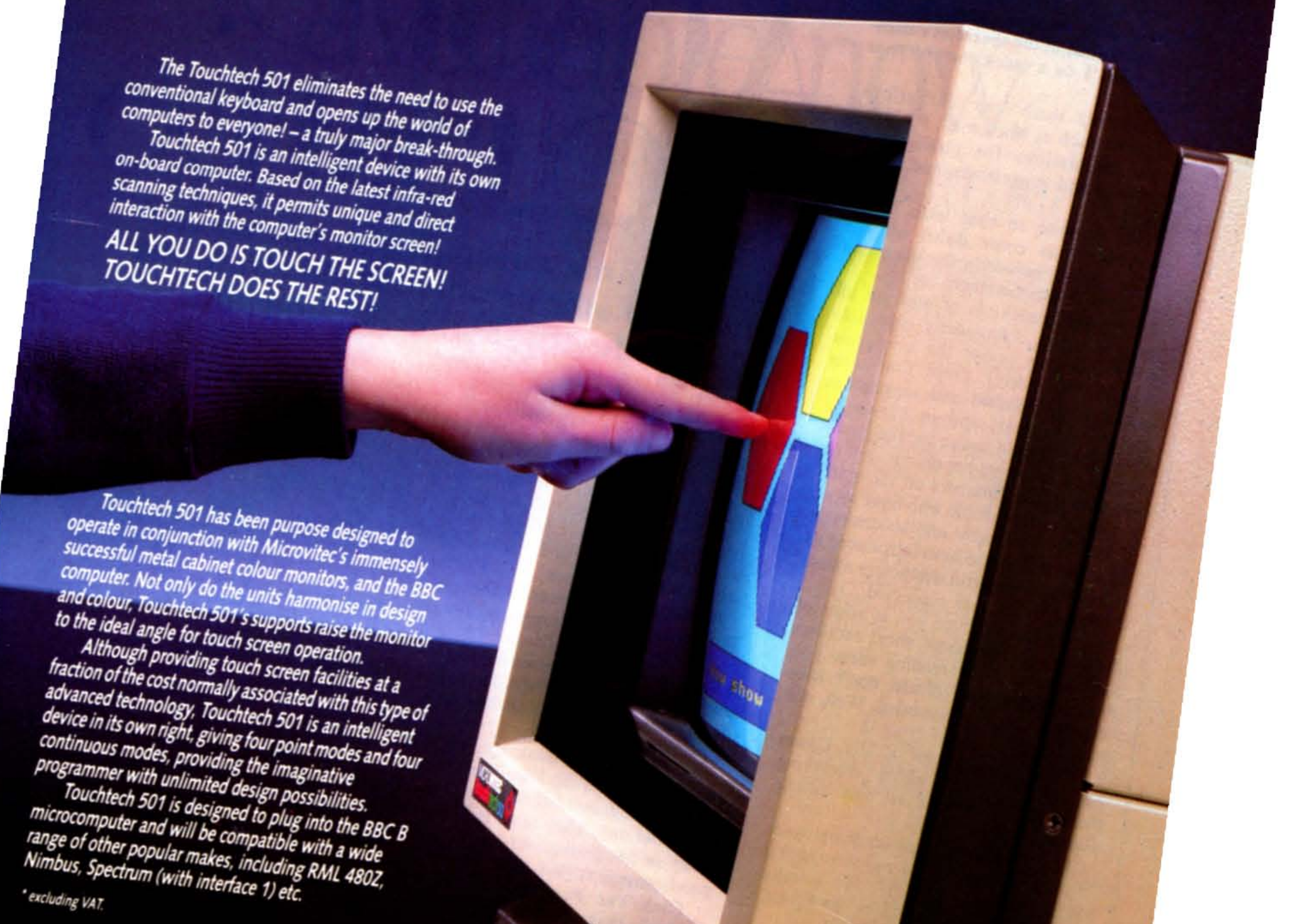

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ALAN McLACHLAN presents . . .

A CAST OF THOUSANDS

. . . where the chess player, pot smoker and ice skater combine to illustrate the lighter side of program debugging

ONE of the most entertaining times of the day in the editorial office is the morning mail session, when, to the accompaniment of the sparrows coughing outside, I do a quick scan of your letters.

I separate them into the various categories such as Micromail, Problem Page, submissions for publication, comments and suggestions, and listing queries.

This is done so that later, when everybody has come down off the ceiling (editor included), the team can tackle the letters together.

We receive sackfuls of mail on all sorts of topics. Particularly enjoyable are those that praise the magazine content (obviously), those that offer constructive criticism and suggestions for improvement, and in particular those that contain praise for the games written by amateurs not on our staff (as opposed to the amateurs on the staff).

Queries from people who have typed in listings incorrectly and so can't get the programs to run have introduced us to a host of wonderful characters whose existence we'd never suspected.

I'd like to introduce you to some of them by quoting some short sections from letters. If on reading them you recognise yourself, please don't take offence as none is intended. Well, not much.

The first character is the **Chess Player:** *"I always check everything thoroughly. I've checked and double checked, but . . ."*

A variant is the **Railway Employee:** *"I've checked every line and there isn't a single fault to be seen".* We usually reply that he's lost track of the listing, and he normally gets the point.

Our favourite is the **Typist:** *"As I have years of experience using a typewriter the chance of any errors being mine are exstreamly unlikely".*

Following closely is the **Postman:** *"I've checked every single letter and I can't find anything wrong".*

More dubious is the **Pot Smoker:** *"I've passed it around among my friends and they all agree there's nothing wrong with it".*

A rather more serious character is the **Doting Parent:** *"I got my Johnny a BBC Micro for Christmas and he's had a lot of fun with it until he typed in your Pyramid Pete. He has spent hours typing it in and it's not fair as he cannot get it to work. There must be a mistake in it as it keeps coming up 'Mistake' all over the place".*

He's the one who says everyone's out of step but our Johnny.

A similar case is **Ice Skater:** *"I've been backwards and forwards over it till I'm blue in the face, and I'm still no further".*

And, of course, the inevitable **Accuser:** *"Having tried all weekend to get your program to run, I'm sure you put deliberate errors in to make people buy your monthly tapes".*

A more dreaded character, though, is **The Improver:** *"Your program does not work properly. The following additions will stop the Mazemunch Goojgies going outside the maze".* (They never did on our original version, but you try convincing him.)

As a Spielberg freak the Features Editor is fond of the **Film Fan:** *"We've searched high and low for Gremlins, but can't find any. They seem to be hidden away in the listing and we're just not good enough to find them".*

Then **The Pacifist:** *"We are not normally the type of family to complain, but all we have is 'Arguments' all over the place".*

We all like **The Rentokill Man:** *"I've got rid of all my bugs but I think you must still have some, and I can't find them",* and **The Motor Maniac:** *"I've run over it time and time again, and I'm sure I'm right".*

These are closely rivalled by the **Search Party:** *"We've checked every entry and there's nothing unusual to be seen",* and the more evil **Masochist:** *"I've made a painstaking check of my listing and can only assume yours to be in error".*

Then there's the **Out of Work GP:** *"I must admit I have run out of patience"* (think about it!) and the **Racing Driver:** *"I've been through it time and time again and it's driving me round the bend".*

The saddest is the **Optimist:** *"I have been told by your telephone receptionist to write in as I am desperate. I have typed in four of your games and can't get any of them to work. I have saved them all on this cassette and ask you to look at them for me and find out where I've gone wrong. I am an absolute beginner and don't know where to start looking for errors".*

At least this last lady admitted that the faults were probably hers. Unfortunately we just don't have the time to provide a debugging service – and certainly not over the phone.

Out of curiosity I took this particular cassette home one weekend and found in the four programs no less than 47 typing errors and four missing lines.

It took me over 10 hours to find them, doing nothing more than looking carefully through the listing and checking every entry against that in the magazine.

Apart from four which I couldn't find without some useful "debugging techniques" all the errors were plainly visible.

OK, they will be more obvious to an experienced eye than to a tyro, but they were there to be spotted with careful scrutiny.

We'll not keep the debugging techniques to ourselves, and intend in the not too distant future to start a series of hints and tips to assist you to find your own programming errors.

Some of you think just like I do. I got a lovely letter from a gentleman who argued: *"If this damn micro is so clever, why, instead of stating 'Missing , at line 20', or 'Missing) at line 40', doesn't it just put them in!"*

He does have a point, doesn't he?

Quite a few letters are still coming in from readers with memory problems. No, they've not forgotten how to program, their listing is most likely perfect and the program loads OK. However when it is run error messages such as 'Bad Mode at line 10', or 'No room at line 200' result.

The programs are inevitably fairly long or have been written in a mode which is a heavy drain on memory, such as Mode 2.

In almost every case a disc filing system is the culprit. Whether you've bought your BBC Micro complete with one, or had your machine upgraded, the DFS uses part of the RAM.

The bad news is that the space the DFS uses is at the bottom of RAM and takes up memory that would normally be available for your program.

However all is not lost. If you think about it, once the program has been loaded into memory you don't need the DFS for a while, and could do with retrieving the memory it has been using.

The good news is that you can! It is a simple matter to copy your program down from the area of memory where it was loaded to a new position at the very bottom of RAM, overwriting the memory the DFS was using.

The program will now have as much memory available to it as if it had been loaded from tape.

Moving a program down in memory like this is called downloading and is standard procedure with experienced disc users. It only needs a one line routine which programs one of the red keys, such as f0, to perform the download.

Our standard downloader is shown in Listing I. Type it in carefully then SAVE and RUN it. Nothing will happen, as all you have done is set up function key 0 ready to download your program.

There's no point in pressing it yet as so far there's no program in memory to download.

The next step is to load in your program. Once you have done this pressing f0 will bring the downloader into operation. After a short pause your program should be ready to run without any memory errors.

```
      5 *KEY0*T.|MD%=PAGE-&E00: FOR
 I% = PAGE TO TOP STEP4:!(I%-D%)=!I
 %: NEXT: PAGE=&E00|MOLD|M
```

Listing I

Anyone in the process of developing or debugging a long program who has had to download it to run it may experience some irritating difficulties when it comes to making corrections, should the program warrant any.

To escape from a downloaded program to correct an error is an unfortunate waste of time. This is because you cannot immediately save the program to disc as your micro no longer recognises the existence of your DFS.

The technique is to spot the error and break out of the current program. You must then load the original from disc, make the necessary correction, save it, then download it again.

Admittedly this is a rather tedious performance, but is a small price to pay for having the speed of a DFS at your disposal.

Even so, the more ambitious among you might like to experiment with my uploader instead.

```
      5 *KEY9|MD%=&1900-PAGE:FOR I%=
TOP TO (PAGE-4) STEP -4:!(I%+D%)=!(
I%):NEXT|M
```

Listing II

Type in Listing II and SAVE it. It sets up function key f9 to do the complete reverse of f0 by uploading the program back to where it started from. This gives the DFS back its work space.

Bear in mind though, if your PAGE defaults to anything other than &1900 you will have to make the necessary alterations to that address in the listing.

One final point. Because the uploading procedure corrupts the disc workspace, once you get the prompt you must immediately press Ctrl/Break, then type OLD Return and finally LIST Return.

You can now make any correction to your program, and by pressing f0 and f9 can upload and download to your heart's content.

By the way, if all your debugging sessions have failed and you have been the **Postman**, the **Pot Smoker**, the **Ice Skater** and any other of my friends, then drop us a line. But first a few more words of advice:

- ● Don't expect an immediate reply. We're as fast as we can be, but we're snowed under.
- ● Do include a self-addressed envelope complete with stamp.

We can't promise to solve all your problems, but we try our best. The request for an SAE also applies to any other type of mail if you want a personal reply.

I hope you've enjoyed meeting each other, and keep typing in those listings. You may not get them to run immediately, but in debugging your errors you'll certainly find no better way of learning the ins and outs of programming.

Stick at it – and ***GOOD LOOK.***

AMSTRAD BBC CBM64 SPECTRUM MEMOTECH ENTERPRISE ATARI MSX

An adventure game is ... program th...

Writing an adventure game for your MSX com... challenge which ... guaranteed to k... many weeks ... months, but it's ... effort becau... get a grea... faction fro... vement, ... how to ... ecial fe... in the ...

It finally happened. Despite saying that I'd never get addicted to adventure games, there I was at two in the morning, staring bleakly at the "What now?" on my television screen. Just how on earth do you get past that hostile woolly mammoth?

The game in question was *Lords of Time* from Level 9 and yes, I was hooked. I didn't need any second telling, therefore, when I was given the chance to meet the creators of the Time Lords, woolly mammoth and all, at their hideout in High Wycombe.

Ask any dedicated adventure player to name a software house, and it's quite likely that the answer will be Level 9. Not only do they produce a range ... consistently high class ... seven differe...

If anyone asked me to recommend a first adventure game to try, I don't think there would be any hesitation in my reply. The obvious choice is Colossal Adventure from Level 9.

In the first place, Colossal Adventure is the original. Scott Adams may have been the first programmer to fit an Adventure onto a lowly home microcomputer (the TRS-80), but his inspiration and the start of the genre was a piece of software written by Americans Crowther and Woods on a mainframe computer back in 1978. In those days memory was scarce and very expensive, so Adam's feat was hailed as nothing short of miraculous. Nevertheless, in my book he stands in Pete Austin's shade.

Pete Austin, Level 9's head Guru, has done wonderful things with text compression - a technique for packing English te... less mem... one byte...

...former ... best ... Terry Jones. It also features graphics and is extremely challenging and up to the best standards of Level 9, who wrote it for Mosaic.

Return to Eden (A, At, B, C, M, S, £9.95) is Level 9's follow-up to their extremely successful Snowball adventure, and the second part of the Silicon Dream trilogy.

Popular

It also includes graphics and is full of the frustration problems which are Level 9's hallmark ... £9.9... puting, ... High Wycom...

...difficult to dr... of the world hidden ... the computer. Be warned, Dungeon Adventure certainly gets ten out of ten for addictive quality!

Level 9 pr... games that a... usually lar... version o... venture ... lot of ... and ...

...become ... affinity between ... ure and a good fantasy ... adventure game su... ability to draw the advent... private world. For this reaso... only adventure succeeds most ... Of Level 9's offerings are a trea... added boon they are each availab... good range of the popular micr... most civilised.

Somehow the ... out that ... trum ... versions of ... graphics but ... the 464 as we... colourful and ... they are too, having ... signed for Level 9 by a ... fessional artist. However, ... yone who has played one ... Pete Austin's adventures ... be well aware, it is the ... chness of the text and the ... of the imagination be- ... plot that makes the ... Eden is a fine ...

Pick of the week

Hard core adventure fans and all persons of taste and discernment will ...

As an adventure fan, I viewed the prospect of reviewing the latest Level 9 game with excitement. This particular game marks something of a landmark since it's the first Level 9 adventure with graphics and, much to my surprise, the game doesn't suffer adversely. Granted the location descrip... shorter than before ... assured there is ... text.

The game ... Snowball an... ego Kim Kir... the Planet Ec... life. The sc... with about 2... of them illustra... any details of the ... keep you busy for man... hour.

The game is full of tricky puzzles, some horrendously devious. You gain points for solving the adventure, not for collecting treasure.

The illustrations are drawn in multicolour mode and while relatively simple, are well designed and do enhance play. Best of all, they're drawn quickly. The game is accompanied by a very good instruction manual and the usual envelope for a free hint.

Overall, excellent value which, in my view, is unsurpassed by any other software house in this country. Buy it and enjoy. A.W.

CRASH Readers Awards 1984 Winner

BEST TEXT-ONLY ADVENTURE

SNOWB...

by LEVEL 9 COMPUT...

Problems and puzzles abound; this is a world unknown to humans and many plants or creatures have odd properties. Just trying to survive ten minutes is difficult ... Level 9 keep rolling those heavy dice on you but give you a few resurrections before finishing you off. Exhausted compulsives of the firm's other works may just as well admit to themselves now that they probably won't be sleeping much the next few months. At ... the ... spheric and original.

...nd ... adventures still represent a large chunk of the ... Level 9 one of the most respected (although ... turned to graphics with their latest release ... this ... hands down, with ...

Eden, another brain scrambling adventure from Level 9 and sequel to **Snowball**. The presentation has changed — the game includes location graphics, yellow word display on a black background and ... That feature ... ahead'. ... input text in ...

The appearance of a new program from Level 9 is a flag-day for all aspiring adventures and, in my household, a signal for the cat to hide under the bed for the duration against the inevitable moment when I go rampaging through the flat, a wild look in my eyes, muttering ferociously about bricklaying birds, nudist beaches and the like. Since *Return to Eden*, the sequel to *Snowball* is out, the cat may be

A new title from Level 9 is always reckoned to be an Event, and Pete Austin groupies won't find anything to disappoint them in Return to Eden – which also ... the 'lost' graphic...

(or every computer, ... able ... Level 9's other games. In fact, Pete Austin is so prolific in adapting his games to other machines, that I fully expect them to be available on washing machines soon! Briefly, it's fully up to Level 9 standard. That's praise indeed.

...been fra... sabotage. Fle... of the woken colonis... steals a stratoglider ... the atmosphere ...

be pos... game b... I'm sure ... before we ... excellent ad... MSX comp...

Level 9 make no se... of their own 'a code' used ... evise *Snowball* and boast ... ever-increasing library of c... pression techniques used ... instigate the likes of *Retu...* *Eden*. These games are ... the length you might exp... the well-written game and ... a well-written game and ... addition, user-friendly, ... intelligent and imag... with good descriptio... ducing a rich atmosph... one ... by the play... with the usual unique problems, ... the usual Level 9 flair, ... less a departure from ...

...ga... galactic ... stellar tra... of human ... you are on th... that all goes well. The game starts with y... awoken from cryogenic... Obviously something is ... you have escaped from ... avoided the now homicid... must endeavour to switc... back to autopilot, as som... aimed the ship at a star. ... This adventure is devious i... Level 9 are to be congratu... writing such an excellent ad... secondly for including a "He... velope. If you are real...

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RETURN TO EDEN: Vegan SF adventure (Amstrad, CBM 64, MSX and Spectrum versions have 240 pictures).	☐	☐
LORDS OF TIME: Imaginative romp through World History.	☐	☐
ERIK THE VIKING: Game of Terry Jones' book for Amstrad, BBC, Commodore 64 and Spectrum only. All with 180+ pictures.	☐	
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AMSTRAD BBC CBM64 SPECTRUM MEMOTECH ENTERPRISE ATARI MSX

Musical Events

GRAHAM WALKDEN shows how interrupts can be used to produce a musical routine

MUSICAL Events is a combined Basic and assembly language program which produces a sequence of musical notes whatever else the micro is doing.

The concept of the routine revolves around interrupts. These are small machine-code routines called at regular intervals by the operating system.

A useful analogy can be found in real life. Imagine you are quietly typing away at your BBC Micro – the foreground task. Then the telephone rings – the interrupt request.

You stop typing, then answer the phone – the interrupt service routine. When you have finished your telephone conversation you return to the micro and continue typing – return from interrupt.

Interrupts are used by the micro all the time. To demonstrate their presence try the following routine:

```
TIME=0:REPEAT UNTIL TIME>1000
```

While this is running press A. When the routine finishes you should see a row of As on the screen. An interrupt routine was executed each time a key was pressed, even while the loop was in operation, inserting any characters typed in into the keyboard buffer.

There are two types of interrupts: NMIs – non-maskable interrupts – and IRQs – interrupt requests which are maskable.

NMIs are high priority interrupts which cannot be masked – turned off. Only certain chips in the micro, such as the 8271 floppy disc controller, are allowed to use them.

The second type can be utilised by the user. Unlike most micros, the BBC Micro operating system allows easy access to custom-made interrupt routines. In this sense, the interrupt routines are called events.

To enable an event it is necessary to type *FX14,x – x being the event number. See Table I. To disable it, use the same procedure but with *FX13,x instead.

Enable	Disable	Event
*FX14,0	*FX13,0	Output buffer empty.
*FX14,1	*FX13,1	Input buffer full.
*FX14,2	*FX13,2	Character entering input buffer, such as key pressed.
*FX14,3	*FX13,3	ADC conversion complete.
*FX14,4	*FX13,4	Start of vertical sync – screen raster returning to top left hand corner.
*FX14,5	*FX13,5	Interval timer crossing 0.
*FX14,6	*FX13,6	Esc pressed.

Table I: Event routines

Before any event routine will work correctly, it must obey certain rules:

☐ The routine must save all registers at the start, then restore them before the RTS at the end of the program. To save the registers use:

```
PHP:PHA:TXA:PHA:TAY:PHA
```

and to restore them use:

```
PLA:TAY:PLA:TAX:PLA:PLP
```

☐ The routine should not last longer than one millisecond, otherwise it may interfere with the micro's normal operation.

☐ The routine must check that it was called by the correct event. The event that called the routine is contained in the accumulator. For example, to check for the vertical sync event insert the following line into your program:

```
20 CMP #4:BNE out
   .
   .
program
   .
   .
100.out
110RTS
```

This will ensure that only this event will call the routine.

☐ The address of the machine code routine must be contained in the event vector – labelled EVENTV. This involves inserting the low and high bytes in &220 and &221, which can be achieved by using MOD and DIV. For example:

```
10 ?&220= address MOD 256:?&221=
address DIV 256
```

To show all these techniques in action, type in Program I which makes a short bleep when Esc is pressed. Enter PAGE=PAGE+1024 then type in the program. Run it, then type *FX14,6 and press Esc.

All being well, a VDU7 bleep will be heard. If you want to change what

→

From Page 103

happens when the routine is serviced, change line 80. If you change it to:

```
80 LDA#65:JSR osasci
```

an A will be printed instead of a bleep sounding.

To return Esc to its normal function, either type *FX13,6 or press Break.

Now to the main part of the article – the music program.

Press Break and then increase PAGE by 1024. Type in Program II then run it.

After a short delay during which the listing of an assembly language program – the actual routine – will appear, the screen will clear, random triangles will appear, and the National Anthem will be played.

To have a look at the listing press Esc, then LIST. The program will be displayed as normal, but you will notice that the tune continues playing.

You may also have noticed that pressing Esc halts the note currently playing. This is because the sound buffer is automatically cleared by the Esc routine. This is a nuisance, but cannot be helped. The rest of the tune will be unaffected.

Under most circumstances – including games – the music will be generated while loading a program. This is true even while operating firmware, such as Wordwise.

In order to customise the program, it is necessary to learn a few basic concepts about the routine.

The program takes up 1k of memory, and before attempting to type it in or load it, it is necessary to enter PAGE=PAGE+1024. This accommodates the machine code routine and the data for the music.

The program is split into three parts. Part one is the graphics routine to demonstrate that the program will run while the micro does something else. This part also calls up part two, and turns on the event using the osbyte call *FX14,4 – *FX13,4 to switch it off again.

Part two is the actual routine. It is written in assembler and uses several variables. The only ones the user has to worry about are *amp* and *delay*.

amp is the variable that holds the amplitude/envelope number for the sound, and *delay* is the delay between successive notes. The only way to get the latter correct is to experiment with different values.

The other variable that needs changing for different tunes is *max*. This defines the number of data bytes – twice the number of notes.

Part three is the data for the music.

VARIABLES

p	Original value of PAGE so routine will work at any PAGE value. For example, with DFS or Econet.
mem	Address of data counter.
mus2	Address of Osword sound data.
music	Data for tune.
max	Number of data bytes – twice the number of notes.
amp	Amplitude/envelope number.
temp	Address of delay counter.
delay	Delay between each note – maximum 255.
P%	Program counter.
EVENT	Address of machine code program.
UNEQ	Address of unequal jump. Called by ADC routine.
OUT	Address of out jump. Called by event check routine.

```
   10 REM Interrupt example program
   20 P%=PAGE-1024:osasci=&FFE3
   30 FOR opt=0 TO 3 STEP 3
   40 [OPT opt
   50 .event
   60 CMP #6:BNEout   \ Insure Escape
 interrupt
   70 PHP:PHA:TXA:PHA:TYA:PHA  \ Save
 registers on the stack
   80 LDA#7:JSR osasci  \ Sound a bel
l
   90 PLA:TAY:PLA:TAX:PLA:PLP  \ Rest
ore registers
  100 .out`
  110 RTS  \ Back to normal operation
s
  120 ]
  130 NEXT
  140 ?&220=event MOD 256:?&221=event
 DIV 256
  150 *FX14,6
  160 REM Enable Escape event - *FX 1
3,6 to disable
```

Program I: Using the event vector

PROGRAM STRUCTURE

Line number	
0 – 60	Call up the music procedure, and enable event number 4 – start of vertical sync.
10020 – 10040	Assign the variables, and poke the data for the channel number and amplitude at memory location *mus2*.
10050	Sets the program counter to assemble the machine code.
10060	Calls up the music procedure.
10100	Checks that the interrupt call was actually number 4.
10110	Stores all registers.
10120,10130	Abort the routine *delay-1* times out of *delay* to leave a space between notes.
10140	Calls up the OS ADC routine to inspect the status of the sound buffer. If there are not enough free spaces, it aborts from the routine so as to prevent the machine halting, until the sound queue empties.
10150	Loads the raw data from temporary storage and inserts it into memory for Osword scrutiny.
10160	Calls up the Osword Sound routine to produce the correct note.
10170	Updates the memory counter.
10180,10190	Checks to see if the end of data has been reached.
10210	Restores all registers.
10270	Sets the correct values in the EVNTV interrupt vectors.
10290 – 10350	READ the music as DATA and poke it into memory for the machine-code program to read. This is generated automatically by the music editor.

MEMORY MAP

Location	Label	Function
p+4	mem	Counter for data number.
p+5 to p+12	mus2	Storage for Osword sound parameters.
p+15 to p+270	music	Data for music – pitch, duration.
p+280 to PAGE-1	EVENT	Machine code program.
PAGE to TOP	usr	User program.

```
    0 REM Musical Events
    5 REM By Graham D. Walkden
    6 REM (C) The Micro User
   10 PROCmusical_events
   20 *FX14,4
   30 MODERND(3)-1:REPEAT
   40 GCOLRND(100),RND(16):PLOT85,RND
(1280),RND(1024)
   50 IFRND(100)=1THEN30
   60 UNTIL0
10000 DEFPROCmusical_events
10010 ENVELOPE1,1,0,0,0,4,4,4,-2,-1,-
1,-1,126,126
10020 p=PAGE-1024:mem=p+4:mus2=p+5:mu
sic=p+15:amp=1
10030 ?mus2=1 MOD 256:?(mus2+1)=1 DIV
 256:?(mus2+2)=amp MOD 256:?(mus2+3)=
amp DIV 256:?mem=0
10040 temp=PAGE-2:?temp=0:delay=15
10050 P%=music+280
10060 PROCmusic
10070 FORi=0TO3STEP3
10080 [OPTi
10090 .EVENT
10100 CMP#4:BNEOUT
10110 PHP:PHA:TXA:PHA:TYA:PHA
10120 INCtemp:LDAtemp:CMP#delay:BNEUN
EQ
10130 LDA#0:STAtemp
10140 LDA#128:LDX#250:JSR&FFF4:CPX#15
:BNEUNEQ
10150 LDXmem:LDAmusic,X:STAmus2+4:LDA
#0:STAmus2+5:INX:LDAmusic,X:STAmus2+6
:LDA#0:STAmus2+7
10160 LDX#mus2 MOD 256:LDY#mus2 DIV 2
56:LDA#7:JSR&FFF1
10170 INCmem:INCmem
10180 LDAmem:CMP#max:BCCUNEQ
10190 LDX#0:STXmem
10200 .UNEQ
10210 PLA:TAY:PLA:TAX:PLA:PLP
10220 RTS
10230 .OUT
10240 RTS
10250 ]
10260 NEXT
10270 ?&220=EVENT MOD 256:?&221=EVENT
 DIV 256
10280 ENDPROC
10290 DEFPROCmusic
10300 p=PAGE-1009:max=88
10310 READa:IFa=-10 ENDPROC:ELSE?p=a
```

```
10320 p=p+1:GOTO10310
10330 DATA81,10,81,10,89,10,77,15,81,
5,89,10,97,10,97,10,101,10,97,15,89,5
,81,10,89,10,81,10,77,10,81,15,89,5,9
7,5,101,5,109,10,109,10,109,10,109,15
,101,5,97,10,101,10,101,10,101,10,101
,15,97,5,89,10,97,10,101,5,97,5,89,5,
81,5,97,15,101
10340 DATA5,109,10,117,5,101,5,97,10,
89,10,81,30
10350 DATA-10
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Program II: Musical Events

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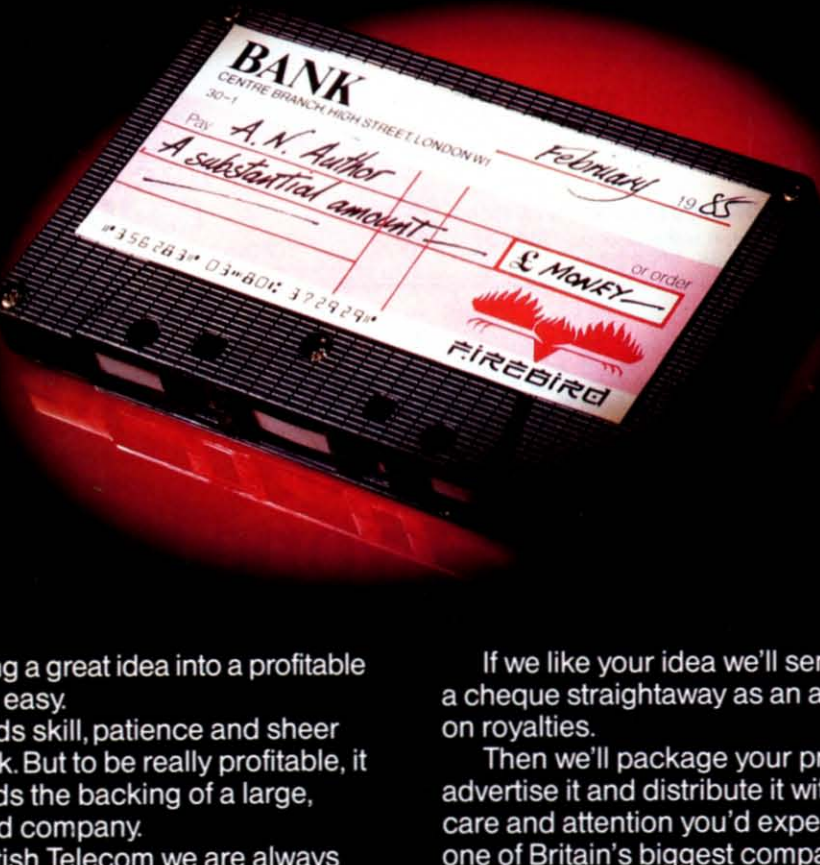
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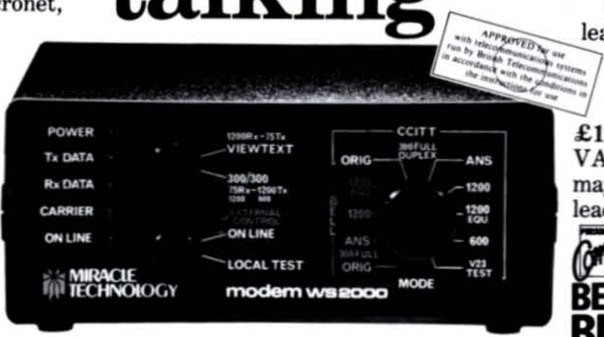

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Softlife
7
8
9
DELETE LINE
4
5
6
DELETE
1
2
3
—
0
•
E
ENTER
numeric keypad

AT last, a decent numeric keypad is available for the BBC Micro.

Although the machine has many excellent inbuilt hardware and software facilities, to many users the lack of a proper numeric keypad has always prevented it from being a "real" business or scientific machine.

Repeated entry of large amounts of numeric data is slow and tedious using the BBC's qwerty type keyboard. It is also tiring and prone to many errors because of the need to constantly move the hands about from key 1 to key 0 or the decimal point key, especially for two fingered would-be typists.

Indeed it is for this reason that, until now, I still use an aged (1979) Commodore Pet for most of my number crunching statistical work, despite the slower processing speed.

Two numeric keypad add-ons are currently available for the BBC Micro, the Datapad 16b from Voltmace and the one from Softlife reviewed here.

Numeric Keypad
Softlife

From first sight of the Softlife keypad at the December Electron & BBC Micro User Show it looked to be a very professional product with its quality full size keys encased in a smart off-white plastic box. The pad is accompanied by software on an 8k eprom and a six page instruction manual.

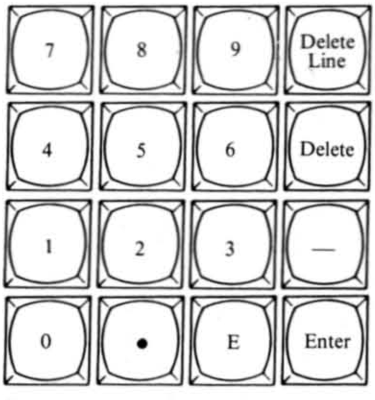

Figure I

I had three criteria which the pad and software had to fulfil for my uses:

- The keypad had to be as reliable and efficient to use as my pocket calculator.
- The package had to be easily adapted to work with my current software.
- The facility had to be easily transportable between machines.

The keypad box measures 15 × 8 × 5cm and is plugged in to the user port by way of a fairly generous 55cm 20 way ribbon cable.

The box also has non-slip feet – essential for one handed operation. The 16 full travel keys are packed close together and each responded to a very light touch.

The whole package seemed very sturdy and even stood up to a fairly stiff hardware test – that is, my three-year-old daughter. It's great. She now operates menu driven programs without even having to *touch* my computer at all!

The layout of the numeric, exponent and decimal point keys corresponds to the standard calculator format with 123 nearest the user (Figure I). This is much more convenient to most number crunchers than the non-standard British Telecom layout which I just cannot get used to.

In addition, a Delete and very useful Delete Line key is provided. On the keypad Enter is equivalent to Return on the micro. Alternative layouts can, however, be made by the user from the software.

In use, data entry via the keypad was at least 25 per cent faster than from the BBC keyboard, but of more importance it was less tiring on the fingers, resulting in less errors. The reduced errors were also helped by having no repeat function on the pad's keys.

However, I did find the box rather high (5cm) and not particularly ergonomic in design. A sloping box, lower at the front, would be a major improvement, enabling easier reach of keys on the back row.

Finally, on a technical note the accompanying manual reminds us that the keypad has its own 5kHz clock generating interrupts when a key is pressed. The Ascii value is entered into the micro's keyboard buffer and is therefore accessible by INPUT, GET, INKEY and so on. This makes the keypad unsuitable for many games which access the keyboard directly.

Following installation of the eprom (8k, but only 5k used) the only requirement to utilise the keypad is to type the command *PAD. From then on numeric data may be entered or deleted from either the numeric keypad or the BBC keyboard.

The software makes no use of user RAM and therefore programs can be adapted to keyboard use simply by incorporating *PAD at the beginning or preceding a run with this command.

A helpful feature of the software is that BBC Micros possessing the eprom announce "Softlife Numeric Keypad" at switch on or following a Ctrl-Break so that compatible machines can be identified.

The version reviewed here (SNKS

→

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2.00, January 1985) also had some features not mentioned in the manual. *HELP NORMAL provided information for fitting and use. This also pointed out that *RELEASE switched off keypad operation and that either command may be preceded by the letter K in case of command clashes.

All the above refer to the software in normal mode – where the key functions correspond to those in Figure I. There is also a programmable mode in which the user can redefine the keys and incorporate them into his or her own program for use with or without the eprom being present in the machine.

For programmable use a short (3k) basic program, MAKEKEY, can be CHAINed from the eprom via the ROM filing system. This allows some or all of the keypad keys to be redefined to any other printable characters or Ascii command codes. This option makes for a very versatile use of the keypad, as the examples in Figure II show.

Surprisingly, Softlife's choice of default alternative hexadecimal pad (Figure IIa) has very few of the functions corresponding to the labels on the keys. I therefore use my own version as shown in Figure IIb, which is much more memorable.

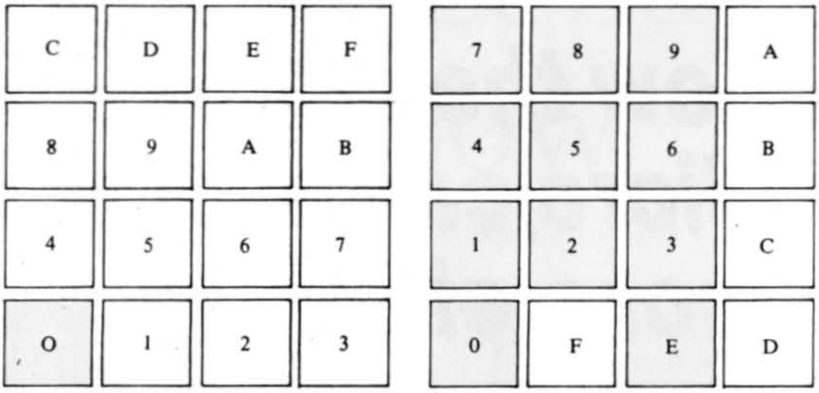
The key definitions and machine code routine are held as a 200 byte file which can be stored on disc or cassette and therefore allow for a very transportable utility. This is even more useful as the MAKEKEY program, key file and hardware can be used on another machine without the eprom fitted.

The user is also given a choice as to where in memory the machine code file is to executed by a *RUN.

Location &0900 seemed to be ideal for most uses and this version performed perfectly with the 6502 second processor, with which the keypad seemed to be totally compatible.

I have used the keypad for a month alongside 10 popular sideways ROMs, including three alternative DFS chips, without any problems. The only point to note is to switch off the programmed mode with *LINE followed by a Ctrl-Break before loading in another keypad file.

In summary, I would say that a numeric keypad is an essential add-on for the BBC Micro for any serious business or scientific use requiring efficient data entry, and this product from Softlife is very good indeed.

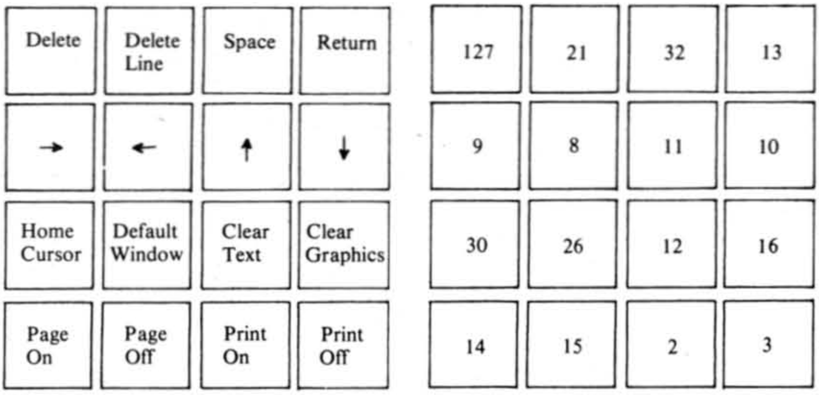


C	D	E	F
8	9	A	B
4	5	6	7
O	1	2	3

(a) Softlife's hexadecimal pad, only one key (shaded) corresponds to key labels.

7	8	9	A
4	5	6	B
1	2	3	C
0	F	E	D

(b) Author's hexadecimal pad, most keys (shaded) correspond to key labels.



Delete	Delete Line	Space	Return
→	←	↑	↓
Home Cursor	Default Window	Clear Text	Clear Graphics
Page On	Page Off	Print On	Print Off

(c) Function command keypad.

127	21	32	13
9	8	11	10
30	26	12	16
14	15	2	3

(d) The Ascii codes used to create the function keypad.

Figure II

The keypad is of good quality, and the software is versatile and readily transportable between machines. It is also very easy to interface with a variety of programs.

However at around £70 I would expect the box to have a sloping top for easier keying before putting this package in the "unbeatable" class.

On a final note, some problems were encountered with the programmable mode in pre 2.00 versions of the eprom which the very helpful people at Softlife have agreed to upgrade free of charge.

Mike Mahon

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Hi-res it isn't, but a good starting point for digital imagery

EV1 Camera
Micro-Robotics

THE EV1 Camera from Micro Robotics must be one of the cheapest ways of getting a video image into the BBC Micro. Once in memory the image can be displayed and modified.

The camera is very small, only 7cm × 5cm × 5½cm. The lens is one from the standard Pentax 110 range with a focal length of 24mm and 2.8 aperture. The only connection to the BBC is by some six feet of ribbon cable which is plugged into the user port. There is a standard tripod mounting socket on the camera's base.

The most important part of the camera is a solid state CMOS image sensor which translates light into a digital signal. The sensor is made up of a large array of individual elements (256 by 128 cells).

The aspect ratio – height of the image compared with its width – is different from a standard TV picture, being shorter for the same width.

Each element of the sensor can be either on or off, so to produce a normal monochrome picture with a number of tones the same scene will need to be scanned a number of times.

Colour images can be produced by superimposing scenes taken with different colour filters.

Interestingly the array is sensitive to the infra-red part of the spectrum, so it can be used for photography with infra-red lighting.

A number of programs which demonstrate some of the capabilities of the camera are supplied on disc or cassette.

EV1 is the simplest, ideal for testing out exposures and focusing the camera. The 24mm lens gives a surprisingly small field for the distance the camera is away from the subject, especially if you're used to a 35mm, or larger format camera.

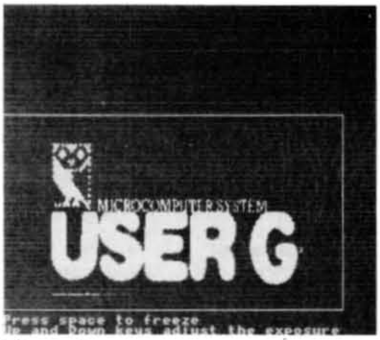
Figure I, showing the top left hand corner of the User Guide from a distance of 20in (about 50cms), gives an idea of the resolution achieved.

The largest letters show up clearly but the tops are slightly distorted because of the blind spot. The letters "Microcomputing System" are at the limit of resolution, while the letters "British Broadcasting Corporation" are too small to even register.

Little experimentation is required to confirm that the best results are achieved with scenes that have high contrast with bold lines.

I was annoyed with the screen dump routine (written in machine code) which always sent a carriage return and a line feed character at the end of a line rather than just a carriage return (the default for the BBC) as many printers are set for.

Movie: This records a series of frames taken with EV1, just like a movie camera, then replays them.



```
ress space to freeze
p and Down keys adjust the exposure
```

Figure I

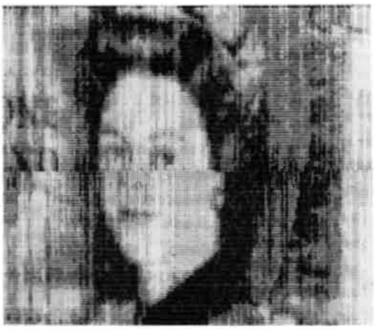


Figure II

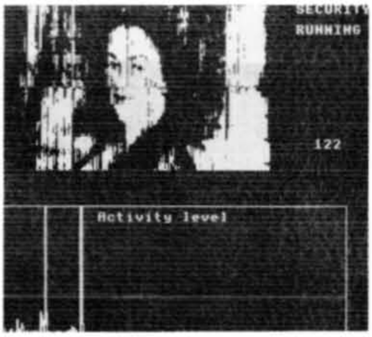


Figure III

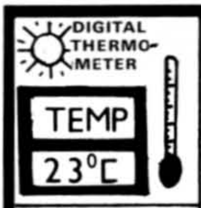
Grey: Rather than just see images in the black and white extremes of EV1, this program displays the picture in a range of eight tones, see Figure II. The tones are automatically adjusted depending on the lightness or darkness of the screen.

Secure: This detects changes between a stored picture and the actual picture the camera is looking at. While running the program will display a graph of the amount of change in the field of view.

In Figure III, two peaks of activity can be seen. In the first a hand was moved in front of the camera, while in the second a hand was passed in front of a light which was illuminating the scene.

→

DIGITAL THERMOMETER



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From Page 111

Arty: With this program pictures are manipulated with the aid of joysticks. Images can be moved around and placed anywhere on the screen, changed in size and superimposed. Colours can be introduced and changed by pressing function keys.

Object: This provides an introduction to the recognition of objects. A number of routines are supplied including ones to define the centre of gravity, length of perimeter and a perimeter definition.

The documentation consists of two A5 size booklets. The first, the Snap Camera Manual, gives details of setting up the camera, the programs, ideas and applications, interfacing and optics.

The last chapter gives details of the machine code routines used by the programs. They are listed in assembler language in the second book.

I find this highly commendable, but some of the directives will be unfamiliar to those who've only used the 6502 assembler in BBC Basic, as they are from a 6800-6502 cross assembler.

Also included is a list of books with further information on artificial vision system and digital image processing.

I did find one or two problems with the system. One with the current sensor array is that there is a blind spot running across the middle of the picture. Another was that the distance scale on the lens underestimated, so that focusing was by trial and error.

To conclude, if you expect full broadcast quality pictures you're going to be disappointed. If you are interested in digital imaging this well thought out package will provide a good starting point.

Jim Notman

COMPATABILITY

-that's the aim of these new DDFS systems

DDFS Systems
Solidisk

BY now most of you will have more than an inkling of what to expect from the multitude of disc filing systems available from Acorn and other suppliers. The advantage of buying a non-Acorn system is that it will almost always be capable of dual-density operation which can expand the capacity of a disc by up to 60 per cent.

The disadvantage is that is may not be compatible with the protection mechanisms of various software packages and games.

There is no way to be really sure because some devious protection techniques involve addressing the 8271 controller chip directly. This can obviously cause problems with the DDFS systems which will be using other chips such as the WDC1770, WDC1797, etc as they will have incompatible controller commands.

However going the official way by buying an Acorn DFS with the 8271 controller is expensive and limits you to single-density mode only.

The way out of this incompatibility problem is supplied within a range of DDFS systems recently released by Solidisk. The new products range from a simple DDFS to a dual-controller system which will allow a WDC1770 and the Intel 8271 controller to exist on the same controller board.

There is even a choice of the DDFS ROM for potential users, an 8k eprom supplies the basic Acorn options while those requiring more features can get a 16k eprom with commands similar to those supplied by some disc utility ROMs.

In terms of performance the DDFS system is very fast and supports the company's claims to the fastest DDFS system around. The normal DDFS comes with the release 1.9 8k eprom which contains all the usual Acorn DFS commands plus a few extra utilities such as disc formatting and verification, single/double-density enable and 40/80 track switching commands.

The ability to format, read, and write 40-track diskettes from an 80 track disc drive is a very useful feature, especially when swapping or buying new program discs.

The DDFS is sensitive to the type of disc used by the drive, and will cater for the correct number of tracks and density mode automatically. It is also compatible with the second processor systems from Acorn, and all in all, it was quite a feat to squeeze so many facilities into an 8k eprom.

The 2.0 16k big brother to the 1.9 8k eprom contains the same facilities plus a load of extra features normally found in utility ROMs such as Disc Doctor from Computer Concepts. The 16k DDFS contains its version of a disc sector editor, memory editor, disc recovery utility, tape to disc copiers, and a curious *RTRACK command. This seems to be an aid to help users inspect the format of a disc and may be useful to people wishing to check on the protection mechanisms of a disc.

Another curious command is *SPEED which can change the speed of the data access on the drive. This command seems to replace the use of the DIP switch at the bottom of the keyboard for speed selection, and it may be an aid to ensure that the controller is not going too fast for your drive unit.

The tape utilities included an intelligent copy to disc from protected tapes, as well as a save to tape from disc. The 2.0 eprom is also capable of copying to and from 40 track and 80 track discs using a single drive, as well as between double and single density discs.

However the most interesting feature of the 16k eprom is that it can also be used by owners of existing Acorn DFS systems who can then avail themelves of the extra features in the 2.0 eprom.

This is possible because the latter is sensitive not only to the tracking and the density of the disc, but also to the controller chip currently in use, which means that it can automatically adjust itself to use either WDC1770 or Intel 8271 controller commands.

This feature can make the 2.0 eprom

Access a world of Information
WITH YOUR BBC MICRO

Today, there are literally hundreds of databases worldwide which can be accessed by your BBC micro. These include Prestel, Micronet, Homelink, Telecom Gold, various 'Bulletin Boards' and massive American data bases such as 'The Source' and 'DIALOG'. The equipment can also be used to send telex messages. The Pace range of inexpensive communications products are designed to provide accurate data exchange whilst being extremely flexible and easy to use.

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NIGHTINGALE
MULTI FUNCTION MODEM
PACE

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S/2592/3/E/500065

Nightingale is by far the most versatile modem available, at the price, for either home or business use. It offers Prestel/Viewdata baud rates (1200/75 & 75/1200) alongside 300/300 baud full duplex for communication between the BBC and other computers, including bulletin boards.

Nightingale has a built-in expansion capability, allowing the addition of auto-answer and auto-dial with battery back-up. The state-of-the-art modem chip technology employed in Nightingale requires minimal support circuitry resulting in low power consumption, low cost, high quality and extreme reliability.

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Nightingale utilises a fully buffered RS 423/232 serial interface and is supplied complete with a lead suitable for connection to the BBC micro, other leads are available on request.

In order to use a versatile modem like Nightingale to its fullest potential, you will require equally sophisticated software. This is where Pace can offer you a total solution — Commstar, unquestionably the most comprehensive communications software available for the BBC.

Commstar is currently the only package for the BBC micro which offers easy access to Prestel (and other viewdata services), together with user to user communication and exceptional file transfer capabilities.

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COMMSTAR - The Software

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COMMS

The complete Nightingale/Commstar package for the BBC micro including the modem, cabling and the Commstar Eprom and manual is just £139 plus V.A.T.

Nightingale is available separately for the BBC and other computers at £119 plus V.A.T. and Commstar is £29.57 plus V.A.T. Further details are available, please telephone or write for comprehensive fact sheets.

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From Page 113

an attractive proposition to owners of existing Acorn DFS systems as they will obtain not only a faster DFS, but a whole set of utilities at a cost below the price of a normal utility disc ROM.

The ability of the 2.0 eprom to detect the controller chip is the basis for the Dual Floppy Disc Controller system, which is the new board that can accommodate two different controllers on one board.

How it works is very simple. The user inserts the required DFS ROM into one of the sideways ROM sockets, or usually into sideways RAM, and then selects the required disc controller chip using the switch supplied with the DFDC board.

If sideways RAM is used then the new DFS and controller can be activated by simply pressing the Break key. This is a feature quite useful to people wishing to use heavily-protected discs which will run only with the 8271 disc controller chip and still retain the capacity to utilise discs in double density mode with another DDFS system.

Installing either the DDFS or DFDC board is very simple. Both boards slot into the socket for IC78, and there are some extra TTL chips to insert around the machine.

For the DFDC, two extra wires from the board have to be connected alongside a couple of chips. The eprom will also have to be inserted into one of the sideways ROM sockets.

The systems that I had for testing generally performed very well, but they were development versions and there were one or two glitches during trials. However the errors were not anything serious and Solidisk should have sorted out the bugs before release.

As a matter of fact, my machine has been using the 1.9 eprom ever since it was fitted in, replacing the slower Acorn DFS that I had. The accompanying manual for the 1.9 eprom was quite well-written and informative, but the manual for the 2.0 version has not been completed at the time of this review.

Overall, all the systems tested were very impressive technically and functionally. Prices for the range are extremely competitive and there is every chance that you will be able to suit your requirements from one of the products.

Chris Chan

Syscon 6, the Commodore connection

Syscon 6
Intelligent Interfaces

THIS interesting new interface is designed to connect the BBC Micro with Commodore peripherals which communicate using the IEEE bus. Just the job if you have, or have access to, a Commodore disc drive or printer and you want to connect them to a decent micro.

Although Commodore Pets were the first micros I used, I quickly grew to dislike them, with their poor Basic and awkward manipulation of a very basic operating system.

While I dislike the CBM micros, I still retain some affection for the peripherals. The disc units are "intelligent". They have two microprocessors, one handling input and output, the other acting as disc controller. They also have their own RAM and controlling software, the Disc Operating System.

This has the advantage of not using very much workspace in the micro itself. Once instructed the disc unit will carry out its task without further intervention of the micro. Commands include format and backup discs, copy, rename, and delete files, as well as more specialised commands such as read and write blocks of data, block allocation and the ability to patch extra machine code into the DOS.

Nice features of the DOS include:

- A large number of catalogue entries can be made.
- Longer file names, up to 16 characters long.
- The catalogue tells you whether the files are PRG (program), SEQ (sequential), USR (user defined), or from DOS 2, REL (relative access).
- No problem with a major irritation of the Acorn DFS, the "Can't extend error". The DOS automatically allocates and keeps track of the blocks of a file. The first two bytes in each block point to the next, so that an individual file may be scattered over a large area of the disc. This makes the maximum number of files (31) and the number of free blocks on a 40 track disc (398) with the Acorn DFS look pretty miserly, especially when comparing it with the 8050.

This is where one of the major benefits of the CDFS lies, especially with word processing with Wordwise or View, when you may want to store a large number of short files.

Why the need for another interface? The trouble is that Commodore uses a non-standard subset of the IEEE interface, which a standard IEEE system will have difficulty dealing with.

Intelligent Interfaces already have experience in this field, as they designed the IEEE interface for Acorn.

To implement the full IEEE system, the Acorn interface used a special control chip (TMS9914). Because the Commodore uses a much simpler system this interface only uses TTL logic chips.

The hardware is housed in a small plastic box 18cm × 12cm × 4cm. On the front panel there is a standard IEEE 24 way connector. Two leads leave the rear panel, a power lead for plugging into the auxillary power socket of the BBC and a ribbon cable for plugging into the 1mHz bus socket.

Controlling software, the CDFS, is

→

Model	No. of Tracks	DOS	No. of Cat entries	No. free Blocks
2040	35	1	152	670
3040	35	1	152	670
4040	35	2	144	663
8050	77	2.5	224	2024

Figure 1: CBM disc drives

From Page 115

supplied on a 16k eprom. This software makes a Commodore disc appear much like an Acorn DFS, with all the standard DFS commands.

In order to achieve this the CDFS does not read standard DOS discs. This can be done with an extra utility that can be bought (see below).

*HELP gives the new commands. Most of them have the same name and act just like the Acorn DFS (see Figure II).

There are four commands extra to the standard DFS in this list.

***FORMAT** formats discs for use with the CDFS. There are options for different disc units. A two character identifier is also asked for. (The CBM uses this for checking whether or not a different disc has been put in the drive, so it's important that each ID is unique.)

Files are written in a different way to standard DOS, so this command prepares a system file, which gives the CDFS information like the autostart option (*OPT 4), the number of available sectors and the number of used sectors.

***INIT** initialises a drive. Necessary with early versions of the DOS when a different disc is placed in a drive. Also useful for clearing certain drive errors.

***ERROR** prints out the status message from the disc drive. I hope that yours is always 00,OK,00,00.

***BLOCK** displays the contents of a specified block. It only gives the hexadecimal value of each location. It would have been more complete if the Ascii equivalents were also given.

So how does the CDFS look? For example with *CAT the following might be displayed:

```
Syscon test disc Identifier T9
Drive 0          Option 3 (EXEC)
Directory :0.$   Library :0.$

Blocks free 000007BE
Blocks used 0000002A

$.NeatLister      L  $.Testfile L
W.SysconReview    L  $.!BOOT  L
$.LongerProgName  L
```

The first feature noted is that there is a slower response than with the Acorn DFS. This is because the disc unit now use an external bus system rather than internal.

This response time is quite normal for a complete CBM system. It is most noticeable with an 8050 drive which takes longer to set itself up internally.

In addition to title, drive, directory and library information, the two character identifier is displayed along with the number of blocks used and the blocks free. The catalogue is not listed in alphabetical order, but with longer file names possible, it's not too difficult to find the file you're looking for.

A problem can arise if there are other ROMs in the BBC which have the same command name. This is because the CDFS will only look at the command name when the operating system passes the command using the File System Control Vector.

This only occurs after other paged ROMs have been asked whether the command was for them or not. Because of this it doesn't matter which socket the CDFS is in, as socket priority doesn't apply to the FSCV.

Watford Electronic's ROM Manager is good for getting round this, as it has an instruction for sending commands directly to the current filing system.

The CDFS will happily co-exist with the Acorn DFS. It is possible to switch between them to transfer files.

The machine code interface is similar to that used with the Acorn IEEE, that is OSWORD A=&80 with the X and Y registers pointing to a parameter block.

As well as all the commands indicated on the *HELP table shown in Figure II, block read and write are implemented, so that some fancy manipulation of straight CBM files is possible.

To save you a lot of time and effort, an extra utility can be bought. This program, called Seqtran, will transfer CBM sequential files to the BBC DFS as a text file. It is then relatively simple to convert into a form that can be used by BBC Basic programs.

Even programs can be transferred if they are first spooled from the CBM micro onto CBM disc, so that they are in an Ascii character sequential file.

While the software is mainly concerned with the disc system, printer drivers are also supplied allowing both Ascii and non-Ascii printers to be used.

The non-Ascii drive is initiated with *CPRINTER, and selected with *FX 5,3.

A specialised driver is necessary because character set is very different from BBC Basic Ascii. A number of the features of these printers, enhanced (enlarged) characters, altered line spacing, inverse characters, and printer paging are implemented.

Ascii printers are initiated with *APRINTER. These drivers allow ESC sequences to be sent. In this mode non-Ascii printers can be used for printing block graphics characters.

Documentation runs to 114 pages in A5 size and is spiral bound. The style is simple, clear and informative. It has a good reference section, each command having a separate page.

All the Basic filing commands, as well as the disc commands are covered. There are separate sections for getting started, data files, using CDFS in assembler, technical information, and using Commodore printers.

This system is not cheap but it's the best thing to happen to Commodore IEEE peripherals for years.

Jim Notman

```
*HELP
CDISK Filing System 0.00
  CDFS
  CUTILS

*HELP CDFS
CDISK Filing System 0.00

  ACCESS <afsp> (L)
  BACKUP <src drv> <dest drv>
  COMPACT (<drv>)
  COPY <src drv> <dest drv> <afsp>
  DELETE <fsp>
  DESTROY <afsp>
  DIR (<dir>)
  DRIVE (<drv>)
  ENABLE
  ERROR
  FORMAT (<drv>)
  INFO <afsp>
  INIT (<drv>)
  LIB (<:DRV.DIR>)
  RENAME <old fsp> <new fsp>
  TITLE <title>
  WIPE <afsp>

*HELP CUTILS
CDISK Filing System 0.00

  BLOCK <track> <sector>
  BUILD <fsp>
  DUMP <fsp>
  LIST   <fsp>
  TYPE  <fsp>
```

Figure II: CDFS commands

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Knock spots off your BBC Micro

DAVID PILLING presents this computer version of the old pub favourite

DOMINOES has been played in one variation or another for hundreds of years, so it's only fair that computers should now be allowed to have a go.

In order to cater for the beginner the game played is the simplest of the many variants.

Each competitor gets 14 dominoes and the first to get rid of them all wins. A competitor who cannot play must "knock" and miss a turn.

Full details of how to play are given by the program at the appropriate point.

As a program, dominoes does not present any great problems. Most of the complexity comes from keeping track of things like who has which dominoes and where they are to go on the screen.

The main difficulty is to devise a mechanism for selecting which dominoes the computer should play. This is handled by the three routines PROCplay, PROCplayf and FNAN.

These implement a sort of one move look-ahead algorithm and do not play too bad a game. However there is some room for improvement, so you might try to think of a better algorithm.

To explain the program's operation it's necessary to introduce some terminology. A domino has two ends, a head and a tail.

When you play you create a chain of dominoes which spreads out and this in turn has a head and a tail.

In the program the head of the chain is at the top of the screen and the tail at the bottom. The program description frequently states that a head or tail is contained in a variable. This means that the variable is set to the numerical value of the head or tail of the domino.

Finally, the two competitors in the game are referred to as the computer or BBC and the player.

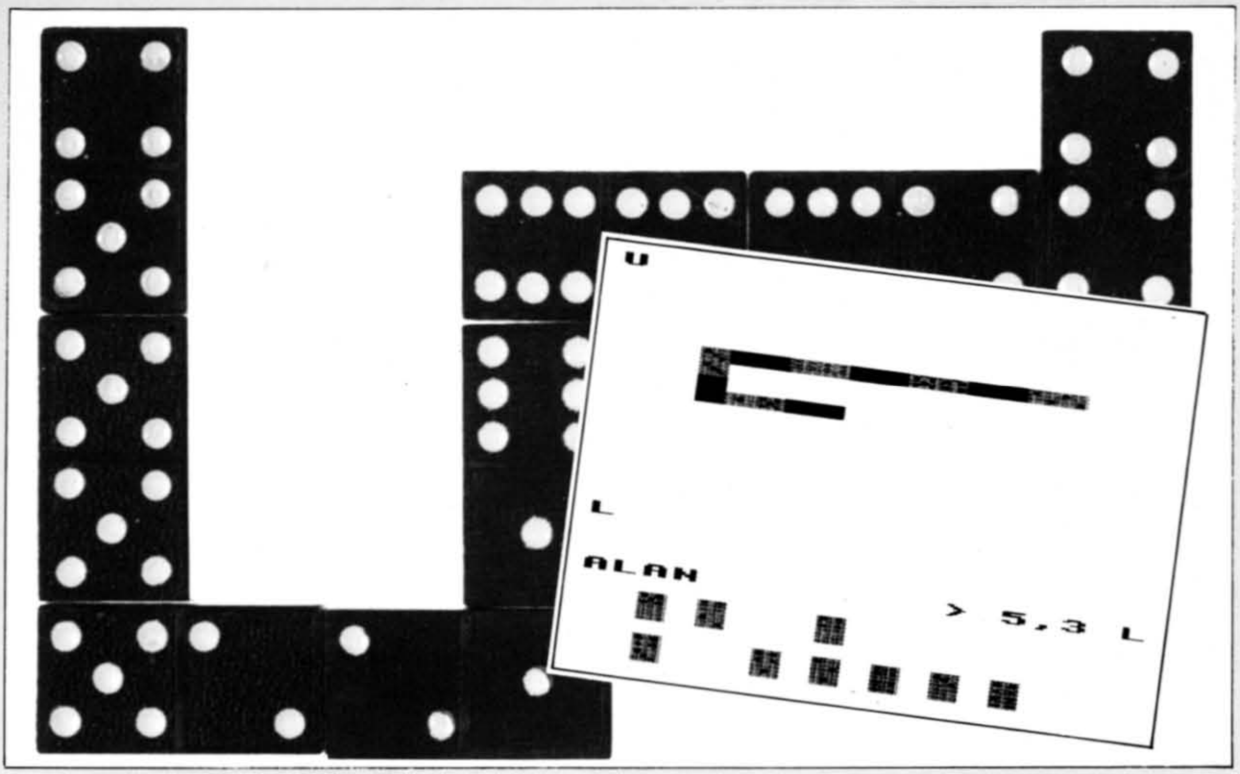
Listing starts on Page 139

MAIN VARIABLES

PNH%(I%,J%)	Value of the head of domino number J% (1 to 14) held by competitor I%.
PNT%(I%,J%)	Value of the tail of domino number J% (1 to 14) held by competitor I%.
PNN%(I%)	Number of dominoes held by competitor I%.
KFN%(I%)	Knock flag for competitor I%.
WFN%(I%)	Win flag for competitor I%.
DH%(J%)	28 possible domino heads.
DT%(J%)	28 domino tails corresponding to DH%(J%).
OVER%	Game over flag.
NOF%(I%)	Number of each of the possible heads and tails I% (1 to 6) still to be played by the player.
N$(I%)	Competitor I%'s name string.
K%	Usually a competitor's number. The BBC is number 1 and the player number 2.
NA%,NB%	Number of wins for BBC and player.
NS%	Number of competitor to start.
H%,T%	Values of the head and tail of the domino chain.
XH%,YH%, XT%,YT%	x and y screen coordinates of the head and tail of the chain.
VFH%,VFT%, HFH%,HFT%	Increments in the ends of the chain in the vertical and horizontal directions.
NVT%,NVH%	Number of vertical steps still to go at the head and tail of the chain, used when the chain is going up the screen to limit the number of upwards steps.
CH%,CT%	Colour of the dominoes at the head and tail of the chain.
E%	Usually represents the end of the chain a domino is being played at E%=0 corresponds to the head of the chain and E%=1 to the tail.

PROCEDURES AND FUNCTIONS

PROCsetup	Deal out dominoes. Set up arrays accordingly.
PROCplaygame	Play one game of dominoes.
PROCplay	Decides which domino the computer is going to play and then plays it. The procedure does this by looking through all the dominoes the computer holds and seeing which could possibly be played and where. FNAN is then used to look at what moves would then be possible. PROCplayf decides which of the possible moves is the best. This procedure has the LOCAL variables PLAY1%. PLAY2%, E1%. E2%. PLAYI%. PLAY1% and E1% hold a number representing how good a move it would be to play the domino currently being looked at and the end of the chain to play the domino. PLAY2% and E2% contain the corresponding quantities but for the best domino to play looked at so far. Finally PLAYI% is the number of the best domino to play.



FNAN(H%,T%,I%)	H% and T% are the new head and tail of the chain after the computer has played domino I%. This function looks to see what the computer could then play and returns a number proportional to how good the move is.
PROCplayf	Using PLAY1% and PLAY2% decides which domino is the best to play and sets PLAYI% accordingly.
PROCgoes (PH%,PT%,E%)	Tries to play a domino with head PH%, and tail PT% at end E% of the chain.
PROCd(J%)	Produces a delay of J%+2 centiseconds.
FNSTART	Plays the first domino. Does necessary things for a BBC or player start. Returns the number of the competitor who started.
PROCpstar	Player starts routine.
PROCcset	Defines domino characters.
PROCsetupboard	Sets up the Mode 5 screen for the game. Initialises variables and defines on screen colours.
PROCahead(H%,T%)	Handles the on screen consequences of adding a domino with head H% and tail T% to the head of the chain.
PROCatail(H%,T%)	Repeat of PROCahead, but for adding a domino to the tail of the chain.
PROCdisplay(K%)	Displays dominoes of player K%. You could put this at the appropriate point to display the computer dominoes, but that would be cheating.
PROCwrmve (H%,T%,E%)	Prints the computer's move domino head H%, tail T% at the end E% on the screen.
PROCdname(I%)	Displays name I% on the screen.
PROCwin(I%)	Handles win by competitor I%. Increments scores.
PROCknock	Makes knocking noise and prints message.
PROCdraw	Handles drawn game.
FNPLAYER	Tempts someone to enter their name for a game of dominoes. Tells them how to play. Returns a string of the player's name.
PROCstartup	Initialises variables and names strings at start of program.
PROCscore	Prints score table and asks if another game required.
FNPM	Gets player's move from the keyboard and checks if it is legal. Returns number of domino to be played.
FNTVAL(A$)	Returns value of A$ if it is a numeric string with a value between 0 and 6, otherwise returns −1.
PROCplayp	Controls the players' moves. Displays their dominoes, gets the domino to play, plays domino and tidies up screen.
PROCmpm(HP%, TP%,EP%,L%)	HP% and TP% are the head and tail of the domino the player is going to play at end EP% (set up in FNPM). L% is the number of the domino to be played. This procedure makes the move and updates the arrays accordingly.

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5) Access any record using Primary Key in 2 seconds
6) Holds—1200 NAMES AND ADDRESS records on 100K disk
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NEW ✱

- GLOBALENTRY enables repetitive data to be typed in once and placed in as many records as required. Can also be used with a search list to provide a powerful global edit/update facility that will save hours of typing.
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- INPUT is a routine included on the disc which will allow you to write utilities for accessing your data and tailored specifically to your needs.
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DISCDEX is only suitable for discs with 31 file names as in the standard ACORN system. It is not suitable for double density interfaces.

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- Ability to dynamically alter control of ONESHOT.
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ONESHOT is a 1.25kb machine code program which gives the user several powerful aids in debugging BASIC programs. These include the ability to SINGLE STEP through the BASIC code of the target program, stopping the processing at specified points and comprehensive trace functions of the variables used by the target program.
A very powerful option allows the user to enter a command string into function key 0 and instruct ONESHOT to obey this command BEFORE each line is executed e.g. *KEY0 PRINT X%¦ M will print the value of X% before executing each line. This is a very simple example and it is possible to do much more complex things including printing the value of a variable only when it changes or when it reaches a certain value or falls within a certain range. This option can also be used to dynamically alter ONESHOT as it is working. The power of this option is only limited by the users ingenuity.
In addition to ONESHOT the disc also contains 3 very useful function key routines. The first will search for any DEFPROC or DEFFN and print the line numbers in which they appear together with the name of the procedure or function. The second will search for a specific procedure or function and print the line numbers containing it. The third routine will print out every active variable together with its present value.
ONESHOT is not compatible with double density interfaces.

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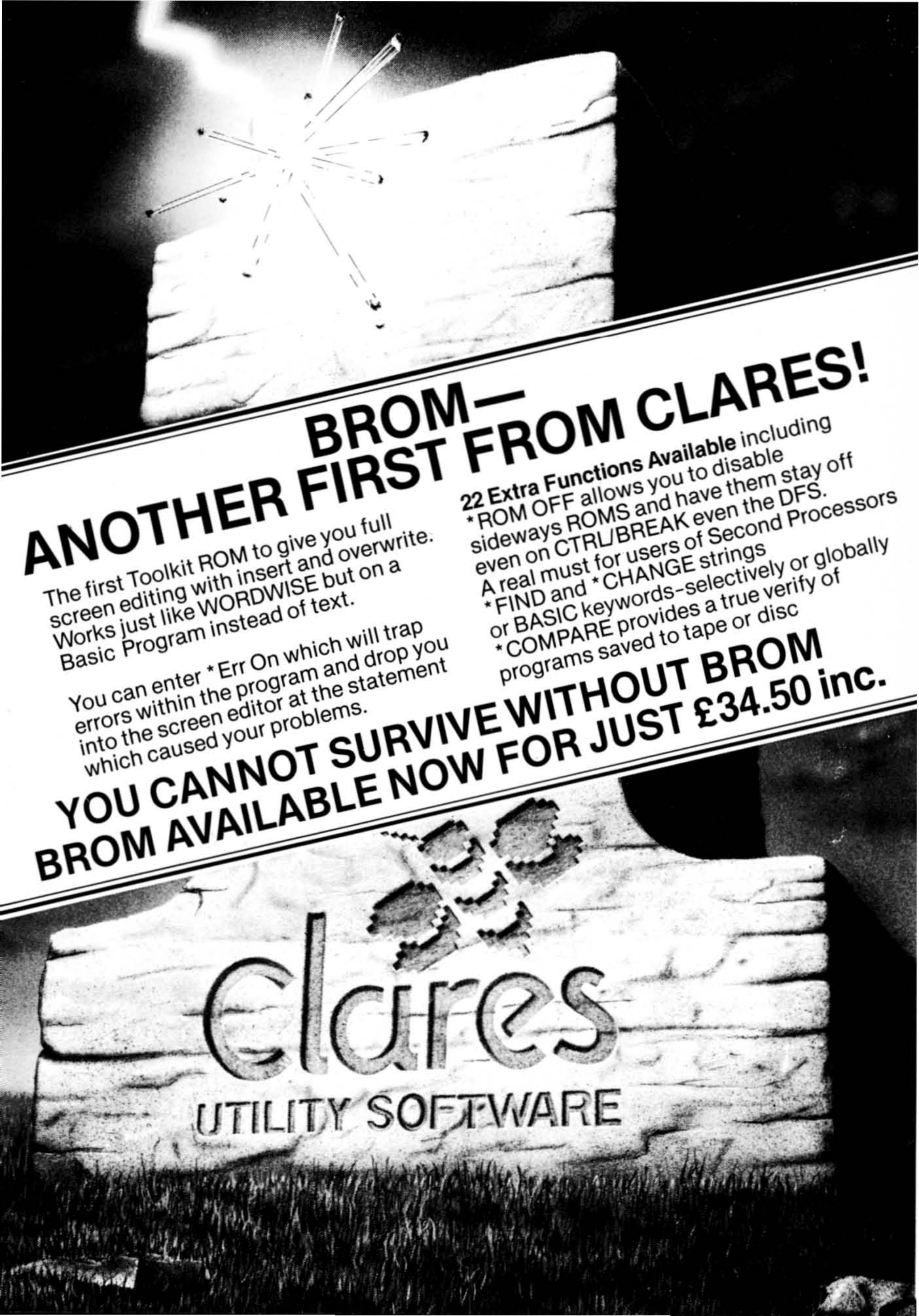

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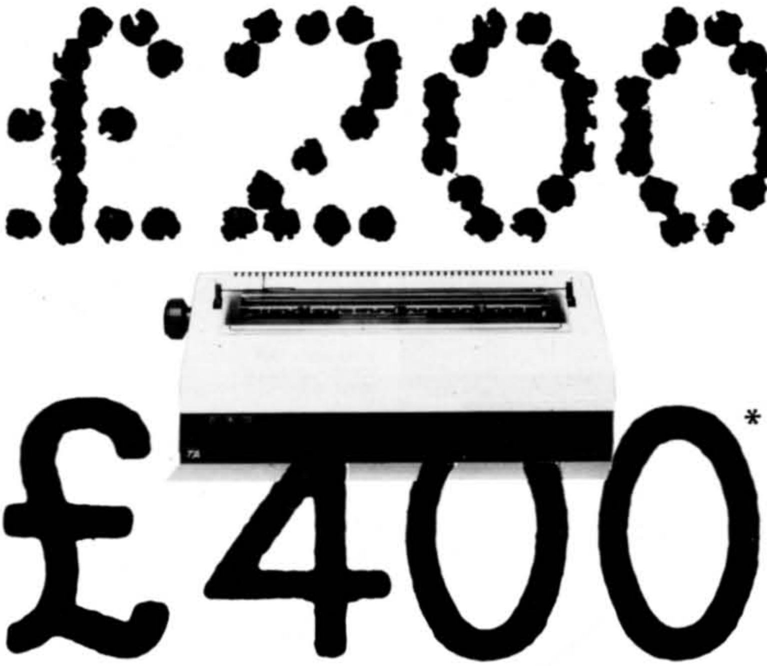

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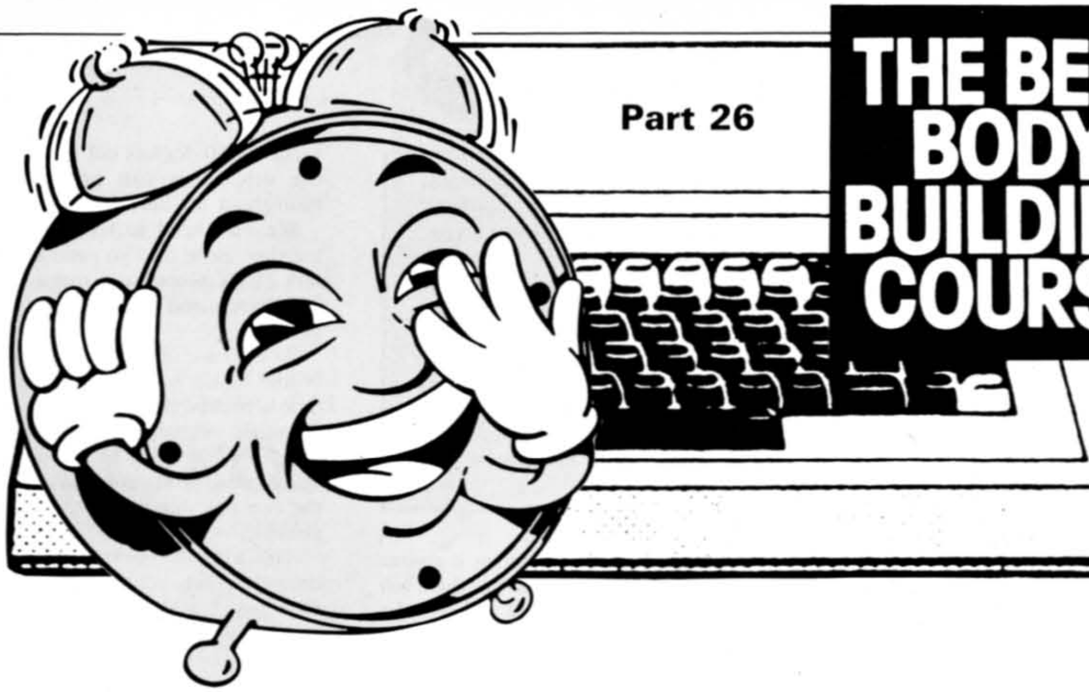

Part 26

THE BEEB BODY BUILDING COURSE

Unleash the potential of potentiometers and get . . .

A SPEAKING CLOCK

By MIKE COOK

YOU know how it is, as soon as you decide exactly what you want you find that nobody makes it any more. This happened to me about two years ago when I decided I wanted a child's clock for a project, the sort they learn to tell the time with.

However I wanted one that was geared so that it could not be set up with an "impossible" time. The average toy shop assistant greeted this request with total incredulity.

When I explained I wanted to interface it to a computer a look of relief swept over their faces. "He is just a simple nutter", they thought.

However perseverence pays off and last month I spied precisely what I was looking for, a cheerful plastic geared clock. I took it home, where my three-year-old son was very excited about "his" new toy.

In fact he was so excited that he refused to let me take it to work to interface it to the computer, and so I ended up having to buy a second one.

So this month we are going to see how to interface a toy clock to our computer so that the computer can read and even speak the time as the hands are moved around.

Basically we have to convert the clock's rotational motion into a form that can be read by the micro.

I first thought of a slotted disc interrupting a light beam. This could then be counted by the computer and the time deduced. However the resolution needed would cause great difficulty in the mechanical construction, so that method was ruled out.

If you have a volume control or variable potentiometer (pot) you have a device that converts rotational movement into a varying resistance which can then be measured using the analogue input port.

The only snag is that the limit of rotation from pots is about 240 degrees. You can get 360 degree rotational devices as used for servo mechanisms but the snag is that they cost about £17 (from Radio Spares).

The plastic clock face that was used to make the speaking clock

Now there's a challenge! My tutor at university always said: "An engineer is someone who can do for a shilling what any fool can do for a pound". So I set about trying to prove that. Despite being an idiot, at least I am no fool.

I set about dismantling several pots to see if I could get the rotation to go all the way round. Needless to say I found a way or I wouldn't have written the article. (I suspect I am no idiot either, but it's just a rumour.)

Most pots work by having a spring contact which wipes around a piece of paxolin on which has been deposited a film of carbon. There are mechanical stops to limit rotation, and the whole assembly is press mounted together. With a little careful persuasion the assembly can be prised apart, although some types of pots are easier to dismantle than others.

The type I found to be the best is a shaftless one used for edge controls (Maplin order No. BW06G). They can be any value, but must be linear.

They are opened by bending up the four metal flanges clamping the case to the base plate. This reveals the carbon track and the springed wiper. Being springed, the pieces will fall on the floor unless you are careful.

In the metal lid a small piece is pressed up to act as a mechanical stop. This must be removed. I did this by placing it on a solid surface and

→

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See Page 168 for further details.

From Page 125

hammering it flat from the inside of the case with a punch.

When re-assembled the pot should now rotate fully, but there is a gap in the paxolin strip that the spring will fall into. This will make rotation very rough, so before re-assembly this gap needs to be filled.

I did this by cutting a small piece of insulation sleeving from some thin twin core screened cable, slicing it lengthways and placing it in the gap. Then I used epoxy resin to secure it in place.

I made sure that the sleeving was flush with the paxolin so as to present the minimum mechanical resistance to the wiper spring. You can trim it with a sharp knife when the epoxy resin is in the semi-set state.

When this is set the whole unit can be re-assembled. Test that the pot travels all the way round smoothly. Now over part of the revolution the pot will not be in contact with the wiper as it passes over the gap. Also at each side there will be a section of track where the resistance does not change as the wiper passes the contacts.

As we want to measure over the full 360 degrees we need to modify another pot in the same way. Now if we gang the pots together, making sure that one wiper is 180 degrees out of phase with the other, we can get a reading throughout the full 360 degrees.

We now need to fix the two pots together. Bend the two outside connectors of the second pot round through 180 degrees and solder them to the first pot.

At the base of the pot are two small prongs meant for mechancial mounting onto a printed circuit board. These will fit snugly over the back of the second pot. They can then be glued together using more epoxy resin. Make sure that the two pots are as closely aligned as possible.

This assembly now has to be fixed onto the clock, which is distributed by Galt Toys (catalogue no. L0564H) and is made of plastic.

The whole gear assembly is held together by the minute hand. Sliding this out of the central cog causes the mechanism to come apart. Not that you need to do this, but one of the two clocks I bought was a little stiff so I took it apart and sprayed a little silicon lubricant on it.

The clock comes with a spare minute hand that plugs in a hole in the back and acts as a stand. When the hands move a block on the back follows suit. The idea is to transfer this movement to the pots.

I took a small piece of $\frac{1}{4}$in wooden dowel and filed the end so that it was a push fit into the centre of the block at the back of the clock. The filing was done by putting the rod in a drill and holding the file against it. So little had to be taken off that I could have done without the drill.

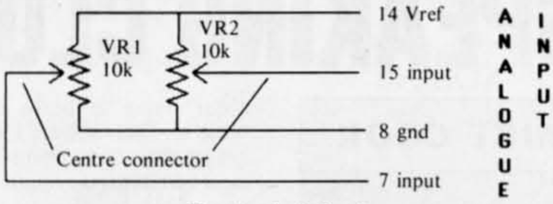
I filed a slot in the base of the dowel to match the bump in the base of the hole. In the other end of the dowel I cut a slot to take a small strip of Perspex. This was to act as a shaft coupling the pots together.

The Perspex was fixed into the dowel with yet more epoxy. I wrapped masking tape around the dowel to hold the glue in while it set around the Perspex.

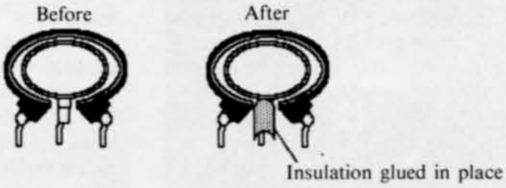
Once you've managed this, push the dowel into the clock. If it is not a good fit you can glue it in. The pots can now be threaded onto the perspex strip. Make sure the two wipers are at opposite sides of the pots.

You can see the wiper through the small hole near the connector terminals. Set it so you can see the wiper on only one pot.

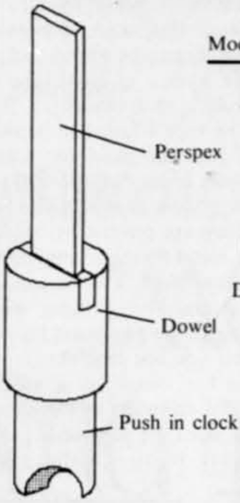
Now we have to stop the pots rotating. To do this I made a bracket with two holes in to slip over the prongs on the pot. This holds the pots in such a

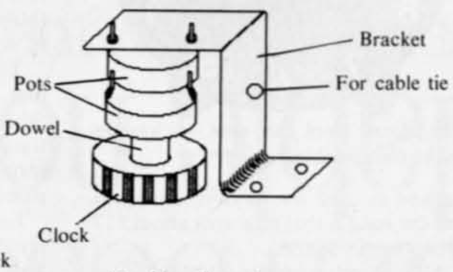


The electrical circuit



Modification of the pot





Attaching the pots

way that they are firm but not rigid.

I drilled the clock face with two countersunk holes to bolt the bracket onto the back of the clock. In this way the pots are held firmly, but have a little play to compensate for everything not being quite square.

A final hole in the bracket was used to thread a cable tie through to anchor the cable.

To bend the bracket simply clamp the aluminium in a vice at the point you want the bend and push it over with your thumbs. Then a light tap with a hammer will finish the job off. I found it easier to drill the holes before I bent the bracket. If it is a little short it can be adjusted by placing washers between it and the back of the clock. Remember it should clamp the pots firmly.

Finally fasten 4 ft of four core cable to the bracket with a cable tie and solder it up to the pots. The other end is soldered to a 15 way D type plug and attached to the analogue input port. Further details can be seen in the diagrams.

All the parts are readily available, but for your convenience they can be obtained as Body Build Pack No. 23. A full list of its contents is shown in the panel on Page 128. You will have to do the drilling and filing as only the raw components are provided.

The idea is that each pot is fed to a separate analogue input channel and that each one covers about 180 degrees of rotation. The program in Listing I is a test routine. Plug the clock in and it will display the value from each pot.

Turn the clock hands round and see the readings change. Both pots should change in the same direction. Note that there will be a section where the reading of one pot will not change with movement of the clock's hands.

Then that pot will give a wildly fluctuating reading as the spring goes off the carbon and the circuit is open. The two pots should give readings separated by roughly 500 units.

When this is working press the Space bar to get the calibration constants you will need in the next program. You are asked twice to move the hands around until you hear a sound. This measures the exact reading of the pots at the cross-over point. That is the point where we stop looking at one pot for the reading and start looking at the other.

The program will then print out four values. These need to be placed in lines 60 to 90 in the program in Listing II. This ensures maximum accuracy with your clock.

The program in Listing II is an example of a simple learning program which can be made with the clock.

It must first be set up by someone who can read the time. This is because, although we know where the minute hand is pointing, we have to count the hours to find out where it is pointing.

The clock is capable of showing the time to the nearest minute, but when teaching little ones you might like to restrict this to the nearest five minutes. The program allows you to select this option. The screen then displays the time given on the clock. As the clock is moved, the time shown changes. Pressing the H key will hide the time message. You can then move the clock to another time. The child can tead the time and test whether they are correct by pressing the R key to reveal the time.

Finally, pressing the Space bar will cause the time to be spoken if you have the Acorn speech system fitted.

A little explanation of the program may not go amiss. The hide, reveal and speech options are all selected by negative inkey values in lines 320 to 340. If you want to change these keys simply change the values.

First we find out what angle the clock is at when the minute hand is pointing straight up. This is a reference with which we correct all future readings.

The heart of the program is the function ANGLE which calculates the angle the minute hand is at by reading the two analogue input channels.

In order to find out which pot to read it has to remember what channel it last used and test this to see if it is still in range. If not it selects the other channel.

Depending on which channel is chosen, there are two exit points from the function, lines 670 and 690. Note that, as this is a function, these lines start with = signs, as does line 600.

The function MINS calculates the position of the hand in minutes from the reading in degrees.

The main loop of the program, lines 230 to 350, calculates and displays the time as well as keeping track of the hour. The option to speak the time should be omitted if a speech synthesiser isn't fitted.

The main cause of inaccuracy will be hysteresis, which is caused by looseness in the coupling between the pots and the clock or between the pots and the bracket.

This will result in a slightly different time being measured depending on whether the hands are being moved

→

```
   10 MODE7
   20 PRINT"BEEB BODY BUILD COURSE"
   30 PRINT"TEACHING CLOCK"
   40 PRINT"By Mike Cook"
   50 PRINT
   60 PRINT"TEST ROUTINE"
   70 PRINT"Press SPACE when ready to
 calibrate"
   80 REPEAT
   90 A%=ADVAL(1) DIV 64
  100 B%=ADVAL(2) DIV 64
  110 PRINT TAB(0,10);"POT 1 reads ";
A%;"   "
  120 PRINTTAB(0,13);"POT 2 reads ";B
%;"   "
  130 UNTIL INKEY(-99)
  140 PRINT"Now move the mins hand"
  150 PRINT"and stop when I bleep"
  160 REPEAT
  170 UNTIL (ADVAL(1) DIV 64)<200
  180 REPEAT
  190 UNTIL (ADVAL(1) DIV 64)>200
  200 SOUND 1,-15,80,2
  210 PROC_DELAY
  220 P1min=ADVAL(1) DIV 64
  230 P2max=ADVAL(2) DIV 64
  240 PRINT"Now move again until I bl
eep"
  250 REPEAT
  260 UNTIL (ADVAL(1) DIV 64)>800
  270 SOUND 1,-15,80,2
  280 PROC_DELAY
  290 P1max=ADVAL(1) DIV 64
  300 P2min=ADVAL(2) DIV 64
  310 PRINT"Calibration Constants are
:-"
  320 PRINT"P1min= ";P1min
  330 PRINT"P2min= ";P2min
  340 PRINT"P1max= ";P1max
  350 PRINT"P2max= ";P2max
  360 END
  370 DEF PROC_DELAY
  380 TIME=0
  390 REPEAT
  400 UNTIL TIME>100
  410 ENDPROC
```

Program I

THE BEEB BODY BUILDING COURSE

From Page 127

clockwise or anti-clockwise. However in my prototype I found this to be no problem.

Testing the program on my three-year-old brought about howls of delight when the computer "said the time", although I think he is a little young yet for serious study.

If the speech chip contained the words "quarter" and "half" and "past" the program could be improved. If you have a phoneme synthesiser or the Computer Concepts Orator chip you could add this to the program.

Given the clock you could write all sorts of teaching games. How about one where the computer asks the child to set the clock at a certain time and tells him when he is right? It could even correct him when wrong and tell him how to put it right.

A program could even keep a score and a record of how the child is doing and be able to plot a graph of his improvement.

As usual, the best part of a Body Build project is how you customise it for your own job.

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- *1 undrilled unbent strip of aluminium.*
- *1 cable tie.*
- *1 piece of wooden dowel.*
- *1 piece of thin Perspex.*
- *1in of two core screened cable (for the insulation to bridge the pot gaps).*
- *2 countersunk 6BA nuts and bolts.*

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– See order form on Page 148

```
   10 MODE7
   15 VDU 23,1,0;0;0;0;
   20 PRINT"BEEB BODY BUILD COURSE"
   30 PRINT"TEACHING CLOCK"
   40 PRINT"By Mike Cook"
   50 PRINT
   60 P1min=224
   70 P2min=205
   80 P1max=959
   90 P2max=856
  100 RESTRICT=FALSE
  110 DISPLAY=TRUE
  120 PROC_INIT
  130 PRINT TAB(0,4);"PUT AT AN O'CLO
CK"
  140 INPUT"What O'clock is it ",H%
  150 PRINT TAB(0,10);"RESTRICT TO NE
AREST 5 MINS (Y/N)"
  160 IF GET$="Y" THEN RESTRICT=TRUE
  170 PRINT TAB(0,10);SPC(40)
  180 PRINT TAB(0,4);"H   -   To hide
 time"
  190 PRINT"R   -   To reveal time"
  200 PRINT"Space bar - To say time"
  210 REF=FN_ANGLE-3
  220 L%=FN_MINS
  230 REPEAT
  240 M%=FN_MINS
  250 IF RESTRICT THEN M%=(INT((M%+2)
/5)*5)
  260 IF M%-L%<-30 THEN H%=H%+1
  270 IF M%-L%> 30 THEN H%=H%-1
  280 IF H%=0 THEN H%=12
  290 IF H%=13 THEN H%=1
  300 IF DISPLAY THEN PRINT TAB(0,10)
;"The Time is ";H%;":";M%;"  " ELSE P
RINT TAB(0,10);SPC(30)
  310 L%=M%
  320 IF INKEY(-99) THEN PROC_SAY
  330 IF INKEY(-85) THEN DISPLAY=FALS
E
  340 IF INKEY(-52) THEN DISPLAY=TRUE
  350 UNTIL FALSE
  360 DEF PROC_INIT
  370 P1R=P1max-P1min
  380 P2R=P2max-P2min
  390 FR=P1R+P2R
  400 DP1=(P1R/FR)*360
  410 DP2=(P2R/FR)*360
  420 P1=FALSE
  430 ENDPROC
  440 DEF PROC_SAY
  450 SOUND -1,267,0,0
  460 SOUND -1,271,0,0
  470 SOUND -1,209,0,0
  480 SOUND -1,128,0,0
  490 PROC_SAYNUM(H%)
  500 SOUND -1,128,0,0
  510 IF M%=0 THEN SOUND -1,231,0,0 E
LSE PROC_SAYNUM(M%)
  520 REPEAT:UNTIL NOT(INKEY(-99))
  530 *FX15,1
  540 ENDPROC
  550 DEF FN_MINS
  560 LOCAL A
  570 A=FN_ANGLE-REF
  580 IF A>360 THEN A=A-360
  590 IF A<0 THEN A=A+360
  600 =INT(A/6)
  610 DEF FN_ANGLE
  620 LOCAL A%,B%
  630 A%=ADVAL(1) DIV 64
  640 B%=ADVAL(2) DIV 64
  650 IF P1 THEN 680
  660 IF B%>P2max OR B%<P2min THEN P1
=TRUE:GOTO 630
  670 =((B%-P2min)/P2R)*DP2+DP1
  680 IF A%>P1max OR A%<P1min THEN P1
=FALSE:GOTO 630
  690 =(A%-P1min)/P1R*DP1
  700 DEF PROC_SAYNUM(N)
  710 IF N=10 THEN SOUND -1,264,0,0:E
NDPROC
  720 IF N=11 THEN SOUND -1,190,0,0:E
NDPROC
  730 IF N=12 THEN SOUND -1,273,0,0:E
NDPROC
  740  IF N>19 THEN SOUND -1,((N DIV
10) +32),0,0:SOUND -1,137,0,0: N=N MO
D 10
  750 IF N>12 THEN SOUND -1,((N MOD 1
0) +32),0,0:SOUND -1,135,0,0:ENDPROC
  760 IF N=0 THEN ENDPROC
  770 SOUND -1,N+48,0,0
  780 ENDPROC
```

Listing II

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To write a record give the relevant command and FILEAID takes the contents of the appropriate variables and writes them to disc. When you read that record it returns the values to their BASIC variables. You can access the file randomly or sequentially and FILEAID takes care of the problem of keeping the index up-to-date.

FILEAID has been written so that it uses every bit of storage you can spare. The more storage available for FILEAID the faster it will work. It dynamically manages the available storage to optimize performance.

To give FILEAID more storage just set PAGE to a higher value. An EPROM command is available to help you do this.

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PLOT 69

If you find standard point plotting too slow, try this routine by MIKE HARRISON

HERE'S a much faster alternative to the standard point plotting routine in the BBC Micro's OS, as it does not bother checking for things like the graphics window, graphics origin, screen mode and so on.

It only works in Mode 2 as long as the screen has not scrolled since a CLS or Mode change.

On entry, A holds the logical colour to be plotted (0..15), X holds the x coordinate (0..159, left to right), and Y holds the y coordinate (0..255, top to bottom).

On exit, A holds the byte written to the screen, X is preserved, and Y=0. No checking is done, so if the colour is greater than 15, the adjacent pixel may be corrupted, and if Y=255 and X>159, data stored in sideways RAM may be corrupted, as a write to memory

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location above &8000 will occur.

This is how it works: The Y coordinate is divided by four and bit 0 masked off. This gives the number of the 640 byte screen row which contains the pixel to be plotted, multiplied by two. This is because the table in the OS used to multiply the row number by 640 is arranged in 2 byte pairs.

The row number is then multiplied by 640 to give the address of the first byte in the row. The position of the pixel within its 8 byte "character block" is calculated for later use by masking off all but the bottom three bits of the Y coordinate.

The address of the 8 byte block containing the pixel is then calculated from the X coordinate. This address, the address within the block, the address of the first byte in the row, and the address of the start of screen memory are then added, to obtain the address of the byte which will contain the pixel.

A mask is used to get rid of the old pixel while preserving the adjacent one in the byte. If the pixel to be plotted is the left-hand one the mask is shifted to the left, as is the new pixel data. The old pixel is then removed, the new one inserted in the byte and the byte replaced on the screen.

It would be easy to modify the routine to do EXOR plotting, by not ANDing the byte with the mask, and changing the ORA to an EOR in line 300. If the routine was required to do both normal and EXOR plotting, the fastest way would be by using self-modifying code. For EXORing the AND instruction in line 310 would be overwritten by two NOPs and the ORA changed to an EOR.

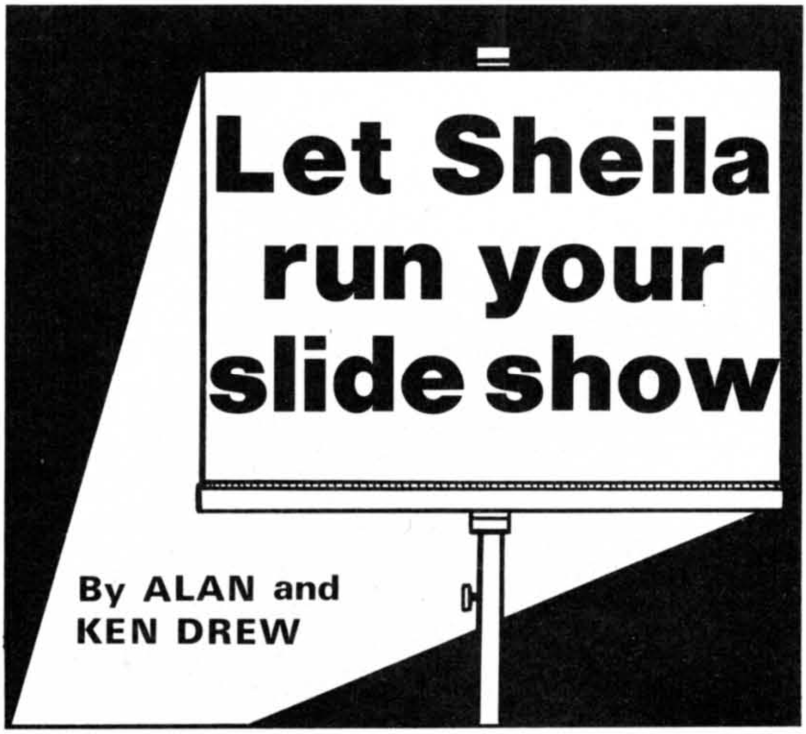
If EXOR plotting only was required, lines 290 and 270 can be deleted to improve speed.

.TEST is just a demo routine which plots all of the 40960 pixels on the screen, the colour being derived from the EXOR of the two coordinates. It takes about 3.4 seconds to do this, so the plotting rate is about 12,000 pixels a second!

As shown, the program works on Basic I and II. If you are using Basic II, of course, lines 330 to 370, which POKE the data bytes into memory, could be replaced by four EQUD statements.

```
 10 REM MEG-FAST 'PLOT 69' ROUTINE
 20 REM (C) The Micro User
 30 REM BY MIKE HARRISON
 40 COL=&70:XT=&71:MASK=&71:YT=&72:ADL=&73:ADH=&74
 50 DIM code% 1000
 60 FOR PASS = 0 TO 3 STEP 3:P%=code%
 70 [OPT PASS
 80 .FPLOT69
 90 STA COL:STY YT            \store colour and Y coordinate
100 LDA #0:STA XT             \temp. store for multiplied X coord.
110 TYA:LSRA:LSRA:AND #254    \screen row no. *2
120 TAY:LDA &C375,Y:STA ADH   \multiply by 640,using OS table
130 LDA &C376,Y:STA ADL       \..and low byte
140 LDA YT:AND #7:STA YT      \position of pixel in 8 byte block
150 TXA:AND #254              \ignore LS bit of X coord.
160 ASL A:ROL XT:ASL A:ROL XT \multiply by 4 to get address of 8 byte block
170 ORA YT                    \add position within 8 byte block
180 ADC ADL:STA ADL           \add address of start of 640 byte row
190 LDA ADH:ADC XT            \to address within row
200 ADC #&30 : STA ADH
210                           \ADL,ADH now hold byte address of pixel
220 LDA #170:STA MASK         \mask to clear bits where pixel will go
230 LDY COL:LDA TABLE,Y        \look up bit pattern for colour
240 STA COL
250 TXA:AND #1:BNE RIGHT       \left or right pixel in byte?
260 ASL COL                    \if left,shift colour bit pattern
270 SEC:ROL MASK               \and shift mask,putting 1 in bit 0
280 .RIGHT LDY #0
290 LDA(ADL),Y:AND MASK        \get old byte and mask off old pixel
300 ORA COL:STA(ADL),Y         \add new pixel and replace byte
310 RTS
320 .TABLE                    \Table of bit patterns for each colour
330 ]
340 RESTORE
350 FOR loop = 1 TO 16
360 READ byte:?P%=byte:P% = P% + 1
370 NEXT loop
380 [
390 .TEST
400 LDX #0:STX &82
410 .TLOOP LDY &82
420 TXA:EOR &82:AND #15
430 JSR FPLOT69
440 INC &82:BNE TLOOP
450 INX:CPX #160:BNE TLOOP
460 RTS
470 ]:NEXT PASS
480 MODE 2:CALL TEST
490 DATA &00,&01,&04,&05
500 DATA &10,&11,&14,&15
510 DATA &40,&41,&44,&45
520 DATA &50,&51,&54,&55
```

This listing is included in this month's cassette tape offer. See order form on Page 174.



Let Sheila run your slide show

By ALAN and KEN DREW

IF you have built *The Micro User's* dual cassette system (July/August 1983), you have the means to control other devices which use a low voltage circuit control.

This project will appeal to those photographically-inclined BBC Micro users who strive for perfect slide shows time and time again, since under computer control you don't even have to press the slide advance button.

Sounds too good to be true? Well this slide projector synchroniser will give a perfectly timed slide show with accompanying music and commentary every time it is run.

The real effort required to produce these perfect presentations is, of course, in the preparation. But with a little practice and a running script from which to work everything will fall into place, and the finished synchronised sound track is ready for numerous perfect showings.

The principle is simple. Upon detection of a previously recorded signal on the cassette alongside the sound track the relay in the interface is operated for a sufficiently long period to actuate the slide change mechanism.

The techniques used include configuring the RS423 interface to generate and later detect short bursts of 2400Hz tone via the cassette, detecting an event using an internal timer and – of course – controlling the user port.

It is Sheila, with all the BBC's internal memory-mapped devices, which will provide this control.

Putting the tone on to the tape is achieved by manipulating the RS423 buffer. When the buffer is full no tone is produced. When it is not full the tone is produced. You don't have to keep filling and emptying the buffer.

OSBYTE call &CB (*FX203) allows you to determine the amount of free space to remain when a buffer full state is to occur. So with two bytes in the buffer (lines 130,140 of Program I), a value of 9 means the buffer is not full (tone is produced) and a value of 255 means the buffer is full (tone not produced).

Program I, the recording stage, puts a half second tone on the cassette every time a key is pressed. It is ended by pressing the Escape key.

PROCinit is a series of *FX calls which sets up the environment for the tones to be created. You will notice that it ends with *FX203,255 and *MOTOR1. The cassette will now be recording nothing.

PROCsync merely waits for a key depression, issues *FX203,9 to start the tone, wait for half a second, then issues *FX203,255 to stop the tone.

In lines 330 and 340 a count is kept and displayed of the slide number. PROCfinish switches off the cassette and resets the RS423 and cassette interfaces.

The RS423 serial interface can be easily configured to use the cassette hardware (lines 990-1060 of Program II). OSBYTE call &CD (*FX205) changes the contents of the serial ULA (&FE10).

Bit 6 selects between the cassette (on) or RS423 (off) systems, hence *FX205,64. This byte is only read at a baud rate change, so *FX7,4 and *FX8,4 are needed at lines 1020,1030.

SHEILA is the name given to the page in memory (page &FE) which is reserved for use by the system hardware.

Following this a master reset of the 6850 is needed.

OSBYTE call &9C (*FX156) updates the ACIA (Asynchronous Communications Interface Adapter) control register. The first value, X, is used to toggle bits after the second value, Y, has masked them.

The official description of this operation is to amend the contents by AND Y EOR X.

Y is then used to leave bits unchanged or switch them off: X is used to change their value (after the AND Y).

The ACIA control register will normally contain &56. *FX156,3,252 will perform '01010110' AND '11111100' giving '01010100' then EOR '00000011' giving '01010111'. The effect has been to switch on bits 0 and 1, which causes the master reset. *FX156,2,252 will restore it to &56 (work it out!).

Program II is made up of a number of routines. A feature is that it completes and leaves the micro free for other uses – provided you don't need to use the cassette or the interrupt/event routine.

You may need to change line 195 depending on which bit in the user port your relay is connected.

PROCvectors (lines 720-890) moves

the contents of two indirection vectors – the IRQ at &204/5 and the EVENT vector at &220/1 – into storage at the end of the appropriate routines, and inserts the addresses of our routines in their place.

In other words, the new routines will "front-end" those of the machine operating system by being given control first, and then passing control to the MOS at the saved addresses.

The only problem in changing interrupt vectors is when an interrupt occurs after only one byte has been changed – and interrupts are always occuring!

To avoid this, interrupts are first disabled (routine sei) and then enabled (routine cli) when the vectors have been changed. PROCassem causes the five assembly routines to be assembled.

The first two are those used by PROCvectors. The remaining three are the main routines. Event (lines 360-480) is the event interrupt handler, timer2 (lines 580-680) is the IRQ handler, and settim (lines 490-570) is the subroutine called by "event" to start the timer.

The event interrupt routine is straightforward. Whenever the 2400 Hz tone is detected it can cause a Data Carrier Detect (DCD) interrupt. This is enabled by OSBYTE call &E (*FX14) at line 980.

It is presented to the system as event number 7 with bit 2 of the status register set. On entry to the event interrupt, the accumulator contains the event number and the status flag is in the X register.

If we do have a DCD event, then the bit in the user port B register (&FE60) must be switched (lines 420-440). The bit is not reset immediately. Timer T2 is used but first needs to be started.

The subroutine 'settim' (lines 490-570) does three things. Timer 2 can be decremented either by using the internal clock at 1MHz of by external pulses on bit 6 of the user port. This is determined by bit 5 of the Auxiliary Control Register (&FE6B), which needs to be off to use the machine clock.

Timer 2 is enabled by setting bit 5 of the Interrupt Enable Register (&FE6E). To set bits in this register, you must write to it with bit 7 and the bit to be set both on. In our case this is '1010000' or &A0.

Finally, the timing operation is to be started. The low order byte goes into &FE68 first, followed by the high order byte into &FE69. Writing to &FE69 causes the timer2 interrupt flag to be reset (as does reading &FE68), and starts the "countdown".

This program uses a value of &FFFF, which is equivalent to about one fifteenth of a second.

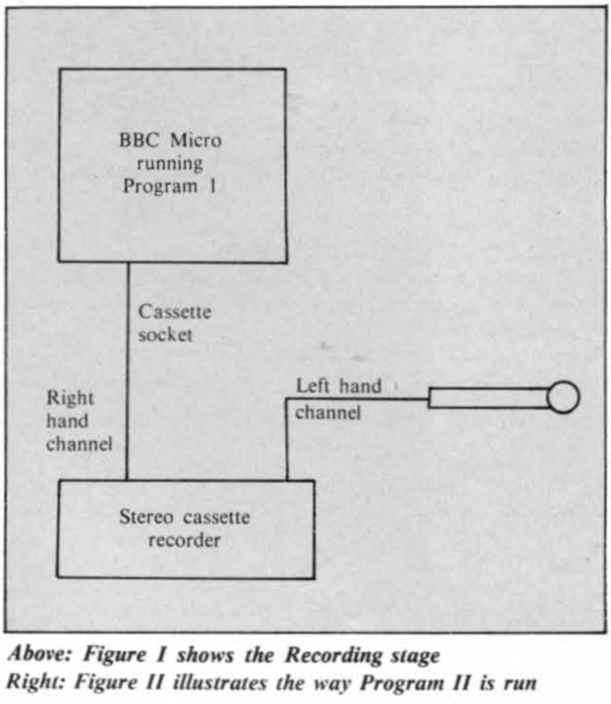
When the timer gets to zero it generates an interrupt. This is detected by the final routine "timer2" (lines 580-680). Interrupts are always occuring in the micro, so we must first check that it is a timer2 interrupt by examining bit 7 of the Interrupt Flag Register (&FE6E).

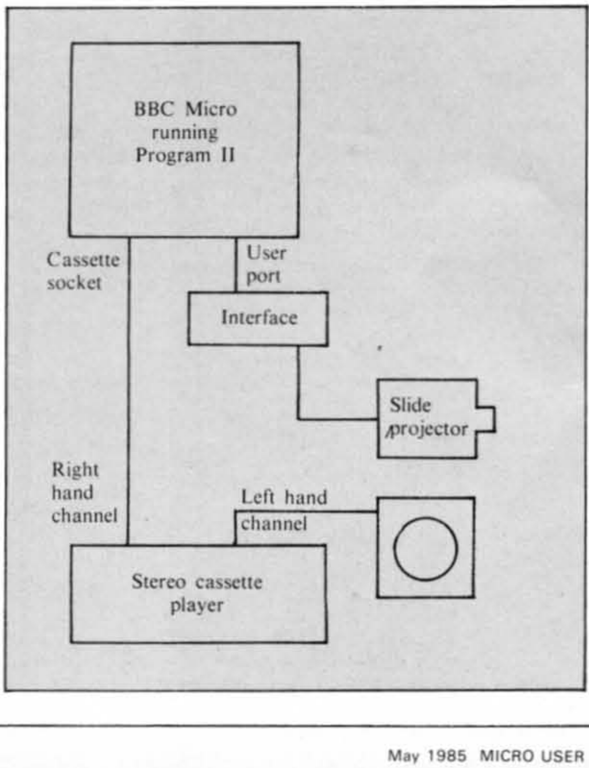
If this bit is on then the bit in the user port register is reset, and the timer2 interrupt flag reset by reading &FE68. PROCrs423 configures the interface to read the cassette, and enables the RS423 event (*FX14,7).

Finally PROCuserport sets the selected bit in the Data Direction Register (&FE62) to configure it as an output, and puts the equivalent bit in the port B register (&FE60) on.

Thus to activate the external device the bit will be set to 0. It is done this way because on, that is 1, is the default state at switch on or system reset.

→





Above: Figure I shows the Recording stage
Right: Figure II illustrates the way Program II is run

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From Page 135

Program I

```
  10 REM******************************
  20 REM This program is used to put
  30 REM a half-second tone on tape
  40 REM whenever a key is pressed.
  50 REM It is stopped by pressing
  60 REMthe escape key.
  70 REM******************************
  80 ON ERROR PROCfinish:END
  90 PROCinit
 100 PROCsync
 110 DEFPROCinit
 120 REM put 2 bytes in buffer
 130 *FX138,1,1
 140 *FX138,1,1
 150 REM enable receive interrupts
 160 *FX2,2
 170 REM configure RS423 as cassette
 180 *FX205,64
 190 REM set 1200 BAUD rates
 200 *FX7,4
 210 *FX8,4
 220 REM reset 6850
 230 *FX156,3,252
 240 *FX156,2,252
 250 REM cause buffer full (no tone)
 260 *FX203,255
 270 REM start cassette
 280 *MOTOR1
 290 ENDPROC
 300 DEFPROCsync
 310 LOCALcount%,a$
 320 REPEAT:count%=count%+1:VDU7,12:
*FX21,0
 330 PRINTTAB(5,5)"Next slide number
 : "STR$(count%)
 340 FORI%=10TO11:PRINTTAB(5,I%)CHR$
141CHR$136CHR$130"Press any key";:NEX
T
 350 a$=GET$
 360 REM cause buffer not full(tone
on)
 370 *FX203,9
 380 TIME=0:REPEAT:UNTILTIME=50
 390 REM cause buffer full (no tone)
 400 *FX203,255
 410 UNTIL FALSE
 420 ENDPROC
 430 DEFPROCfinish
 440 ON ERROR OFF
 450 REM switch motor off
 460 *MOTOR0
 470 REM restore RS423
 480 *FX205,0
 490 *FX2,0
```

Let Sheila run your slide show

```
 500 REM clear buffer
 510 *FX21,1
 520 CLS
 530 ENDPROC
```

Program II

```
 10 REM***************************
 20 REM This program will set up a
 30 REM routine to process event 7
 40 REM which occurs when the tone
 50 REM on a tape is detected.
 60 REM It will have configured
 70 REM one bit of the user port
 80 REM AS an output to activate a
 90 REM relay which in turn can
100 REM  activate a  remote
110 REM controlled slide projector.
120 REM The bit is normally on, but
130 REM will be switched off when
140 REM the tone is detected.
150 REM Timer2 is set going at its
160 REM maximum value (&FFFF) and
170 REM upon its completion will
180 REM set the bit on again.
190 REM**************************
194 REM Select the bit to be used
195 BITON=&80:BITOFF=BITON EOR &FF
196 REM &80 is bit 7 &01 is bit 0
199 REM**************************
200 PROCassem
210 PROCvectors
220 PROCuserport
230 PROCrs423
240 END
250 DEFPROCassem
260 ASM%=3
270 DIM s% 4
280 FORpass%=0TOASM%STEPASM%
290 P%=s%
300 [OPTpass%
305 .sei
310    SEI:RTS \ disable interrupts
315 .cli
320    CLI:RTS \  enable interrupts
330 ]
340 P%=&D00
350 [OPTpass%
355 .event
360    CMP #7    \ RS423 event?
370    BNE not7  \ no
380    PHA       \ save accum
390    TXA       \ get X register
400    AND #2    \ is BIT 2 on?
410    BEQ notdcd \NO - not DCD
420    LDA &FE60 \ get portB reg
430    AND #BITOFF \ put bit off
440    STA &FE60 \ store portB reg
450    JSR setim \ set timer2 away
455 .notdcd
460    PLA       \ restore accum
465 .not7
470    JMP (xevnt) \ carry on (OS)
```

→

Sheila listing

From Page 137

```
475 .xevent
480    NOP:NOP   \ event vector
485 .setim
490    LDA &FE6B \ get Aux ctl reg
500    AND #&DF  \ put BIT 5 off
510    STA &FE6B \ put it back
520    LDA #&A0  \ BITs 7 and 5 on
530    STA &FE6E \ to enable ints
540    LDA #&FF  \ max timer value
550    STA &FE68 \ low byte
560    STA &FE69 \ high/clear flag
570    RTS        \ end of routine
575 .timer2
580    PHA         \ save accum
590    LDA #&80   \ BIT 7 on
600    AND &FE6D  \ in int.fl.reg
610    BEQ extim2 \ no-not for us
620    LDA &FE60  \ port B reg
630    ORA #BITON \ put bit on
640    STA &FE60  \ store it back
650    LDA &FE68  \ clear T2 int
655 .extim2
660    PLA         \ restore accum
670    JMP (timret) \ vector (OS)
675 .timret
680    NOP:NOP    \ save for vect
690 ]
700 NEXTpass%
710 ENDPROC
720 DEFPROCvectors
730 REM **** DISABLE INTERRUPTS ***
*
740 CALL sei
750 REM SAVE EVENT INDIRECTION VECT
OR
760 ?xevnt=?&220
770 xevnt?1=?&221
780 REM SET OUR EVENT INDIR.VECT
790 ?&220=event MOD 256
800 ?&221=event DIV 256
810 REM SAVE INTERRUPT INDIR. VECT
820 ?timret=?&204
830 timret?1=?&205
840 REM SET OUR INTERRUPT INDIR. VE
CT
850 ?&204=timer2 MOD 256
860 ?&205=timer2 DIV 256
870 REM **** ENABLE  INTERRUPTS ***
*
880 CALL cli
890 ENDPROC
900 DEFPROCuserport
910 REM CONFIGURE USER PORT
920 ?&FE62=BITON
930 REM BIT 0 ON
940 ?&FE60=BITON
950 ENDPROC
960 DEFPROCrs423
970 REM ENABLE RS423 EVENT
980 *FX14,7
990 REM INDICATE RS423 IS CASSETTE
1000 *FX205,64
1010 REM SET 1200 BAUD RATES
1020 *FX7,4
1030 *FX8,4
1040 REM RESET 6850
1050 *FX156,3,252
1060 *FX156,2,252
1070 REM CAUSE BREAK IN DATA CARRIER
1080 *MOTOR0
1090 *MOTOR1
1100 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 174.

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Dominoes listing

From Page 119

```
   10 REM ========================
   15 REM
   20 REM DOMINOES
   30 REM By D. J. Pilling
   40 REM (c) The Micro User
   45 REM
   50 REM ========================
   60 REM
   70 DIM PNH%(2,14),PNT%(2,14)
   80 DIM PNN%(2),KFN%(2),WFN%(2)
   90 DIM DH%(28),DT%(28),NOF%(6),N$(2)
  100 PROCcset
  110 MODE7:VDU23;8202;0;0;0;
  120 PROCstartup
  130 REPEAT
  140 PROCsetup
  150 MODE5
  160 PROCsetupboard
  170 PROCplaygame
  180 MODE7:VDU23;8202;0;0;0;
  190 PROCscore
  200 UNTIL OVER%
  210 END
  220 DEFPROCsetup
  230 FORH%=0TO6:NOF%(H%)=8:NEXT
  240 N%=0
  250 FORH%=6 TO0 STEP-1
  260 FORT%=H% TO0 STEP-1
  270 N%=N%+1:DT%(N%)=T%:DH%(N%)=H%
  280 NEXT:NEXT
  290 FORI%=1TO 14:FORK%=1TO 2
  300 J%=RND(28):IFDH%(J%)=-1:GOTO300
  310 PNH%(K%,I%)=DH%(J%):PNT%(K%,I%)=DT%(J%)
  320 IFK%=1 NOF%(DH%(J%))=NOF%(DH%(J%))-1:NOF%(DT%(J%))=NOF%(DT%(J%))-1
  330 DH%(J%)=-1:DT%(J%)=-1
  340 NEXT:NEXT
  350 PNN%(1)=14:PNN%(2)=14
  360 H%=0:T%=0
  370 ENDPROC
  380 DEFPROCplaygame
  390 I%=FNSTART:IFI%=1GOTO430
  400 PROCdname(1)
  410 PROCplay:IFWFN%(1):PROCwin(1):ENDPROC
  420 IF(KFN%(1)ANDKFN%(2)) PROCdraw:ENDPROC
  430 PROCplayp
  440 IFWFN%(2):PROCwin(2):ENDPROC
  450 IF(KFN%(1)ANDKFN%(2)) PROCdraw:ENDPROC
  460 GOTO400
  470 ENDPROC
  480 DEFPROCplay
  490 LOCAL I%,PLAYI%,PLAY1%,PLAY2%,E1%,E2%
  500 I%=1:PLAYI%=0:PLAY1%=0:PLAY2%=0:E1%=0:E2%=0
  510 FORI%=1TO14
  520 IFPNH%(1,I%)=H%:PLAY1%=FNAN(PNT%(1,I%),T%,I%):E1%=1:PROCplayf
  530 IFPNH%(1,I%)=T%:PLAY1%=FNAN(H%,PNT%(1,I%),I%):E1%=0:PROCplayf
  540 IFPNT%(1,I%)=H%:PLAY1%=FNAN(PNH%(1,I%),T%,I%):E1%=1:PROCplayf
  550 IFPNT%(1,I%)=T%:PLAY1%=FNAN(H%,PNH%(1,I%),I%):E1%=0:PROCplayf
  560 NEXT
  570 IFPLAYI%=0 KFN%(1)=TRUE:PROCknock:ENDPROC ELSEKFN%(1)=FALSE
  580 PROCwrmve(PNH%(1,PLAYI%),PNT%(1,PLAYI%),E2%)
  590 PROCgoes(PNH%(1,PLAYI%),PNT%(1,PLAYI%),E2%)
  600 PNH%(1,PLAYI%)=-1:PNT%(1,PLAYI%)=-1
  610 PNN%(1)=PNN%(1)-1
  620 IFPNN%(1)=0 WFN%(1)=TRUE ELSEWFN%(1)=FALSE
  630 ENDPROC
  640 DEFFNAN(H%,T%,I%)
  650 LOCAL L%,A1%,A2%,AL%
  660 IFPNN%(1)=1 =31
  670 A1%=0:A2%=0:AL%=0
  680 FORL%=1TO14
  690 IFL%=I% GOTO720
  700 IF((PNH%(1,L%)=H%)OR(PNH%(1,L%)=T%)) A1%=14-NOF%(PNT%(1,L%)):IF A1%>A2% A2%=A1%:AL%=L%
  710 IF((PNT%(1,L%)=T%)OR(PNT%(1,L%)=H%)) A1%=14-NOF%(PNH%(1,L%)):IF A1%>A2% A2%=A1%:AL%=L%
  720 NEXT
  730 IF(NOF%(H%)+NOF%(T%)=0)ANDAL%>0 :=A2%+15
  732 IFAL%>0 :=A2%
  735 =14-NOF%(H%)+NOF%(T%)
  740 DEFPROCplayf
  750 IFPLAY1%>PLAY2% PLAY2%=PLAY1%:PLAYI%=I%:E2%=E1%
  760 IFPLAY1%=PLAY2% IFRND(2)=1PLAYI%=I%:E2%=E1%
  770 ENDPROC
  780 DEFPROCgoes(PH%,PT%,E%)
  790 IFE%=0 GOTO820
  800 IFH%=PH% PROCahead(PH%,PT%):H%=PT%:ENDPROC
  810 IFH%=PT% PROCahead(PT%,PH%):H%=PH%:ENDPROC
  820 IFT%=PH% PROCatail(PH%,PT%):T%=PT%:ENDPROC
  830 IFT%=PT% PROCatail(PT%,PH%):T%=PH%:ENDPROC
  840 ENDPROC
  850 DEFPROCd(J%):J%=TIME+J%:REPEATUNTIL TIME>J%:ENDPROC
  860 DEFFNSTART
  870 LOCAL N%,M%
  880 IFNS%=1 NS%=2 ELSENS%=1
  890 N%=NS%
  900 PROCdname(N%)
  910 COLOUR2:COLOUR128
  920 PRINTTAB(14,24)"STARTS"
  930 PROCd(200):PRINTTAB(14,24)"        "
  940 IFN%=2 PROCpstar:=2
  950 M%=RND(14)
  960 H%=PNH%(N%,M%):T%=PNT%(N%,M%)
  970 PROCwrmve(H%,T%,1)
  980 PNH%(N%,M%)=-1:PNT%(N%,M%)=-1
  990 PROCatail(H%,T%)
 1000 PNN%(N%)=PNN%(N%)-1
 1010 PROCd(100)
 1020 =N%
 1030 DEFPROCpstar
 1040 LOCAL HP%,TP%,EP%,L%
 1050 PROCdisplay(2)
 1060 L%=FNPM
 1070 IFL%=0GOTO1060
 1080 H%=HP%:T%=TP%
 1090 PROCwrmve(H%,T%,EP%)
 1100 PNH%(2,L%)=-1:PNT%(2,L%)=-1
 1110 PROCatail(H%,T%)
 1120 PNN%(2)=PNN%(2)-1
 1130 NOF%(H%)=NOF%(H%)-1
 1140 NOF%(T%)=NOF%(T%)-1
 1150 PROCdisplay(2)
 1160 PROCd(50):COLOUR128
 1170 PRINTTAB(0,24)B$'B$'B$'B$'B$'B$'B$
 1180 PROCd(100)
 1190 ENDPROC
 1200 DEFPROCcset
 1210 VDU23,240,0,0,0,0,0,0,0,0
 1220 VDU23,241,0,0,0,24,24,0,0,0
 1230 VDU23,242,0,96,96,0,0,6,6,0
 1240 VDU23,243,0,96,96,24,24,6,6,0
 1250 VDU23,244,0,102,102,0,0,102,102,0
 1260 VDU23,245,0,102,102,24,24,102,102,0
 1270 VDU23,246,0,102,0,102,0,102,0,0
 1280 ENDPROC
 1290 DEFPROCsetupboard
 1300 VDU19,1,4,0,0,0
 1310 VDU19,2,7,0,0,0
 1320 VDU19,3,1,0,0,0
 1330 VDU23;8202;0;0;0;
 1340 XH%=3:XT%=3:YH%=9:YT%=10
 1350 VFT%=1:HFT%=0:VFH%=1:HFH%=0
 1360 NVT%=2:NVH%=2:CH%=1:CT%=-1
 1370 COLOUR2:COLOUR128
 1380 PRINTTAB(0,2)"U":PRINTTAB(0,20)
```

Dominoes listing

From Page 139

```
"L"
 1390 ENDPROC
 1400 DEFPROCahead(H%,T%)
 1410 IFXH%<16 GOTO1430
 1420 IFNVH%=0 NVH%=2:HFH%=0:VFH%=1 E
LSEIF NVH%=1 NVH%=0:HFH%=-1:VFH%=0 EL
SENVH%=1
 1430 IFXH%>3 GOTO1450
 1440 IFNVH%=0 NVH%=2:HFH%=0:VFH%=1 E
LSEIFNVH%=1 NVH%=0:HFH%=1:VFH%=0 ELSE
NVH%=1
 1450 XH%=XH%+HFH%:YH%=YH%+VFH%
 1460 COLOUR(130+CH%):COLOUR2:PRINTTA
B(XH%,YH%)(CHR$(240+H%))
 1470 XH%=XH%+HFH%:YH%=YH%+VFH%
 1480 COLOUR(130+CH%):COLOUR2:PRINTTA
B(XH%,YH%)(CHR$(240+T%))
 1490 CH%=-CH%
 1500 ENDPROC
 1510 DEFPROCatail(H%,T%)
 1520 IFXT%<16GOTO1540
 1530 IFNVT%=0 NVT%=2:HFT%=0:VFT%=1 E
LSEIFNVT%=1 NVT%=0:HFT%=-1:VFT%=0 ELS
ENVT%=1
 1540 IFXT%>3 GOTO1560
 1550 IFNVT%=0 NVT%=2:HFT%=0:VFT%=1 E
LSEIFNVT%=1 NVT%=0:HFT%=1:VFT%=0 ELSE
NVT%=1
 1560 XT%=XT%+HFT%:YT%=YT%-VFT%
 1570 COLOUR(130+CT%):COLOUR2:PRINTTA
B(XT%,YT%)(CHR$(240+H%))
 1580 XT%=XT%+HFT%:YT%=YT%-VFT%
 1590 COLOUR(130+CT%):COLOUR2:PRINTTA
B(XT%,YT%)(CHR$(240+T%))
 1600 CT%=-CT%
 1610 ENDPROC
 1620 DEFPROCdisplay(K%)
 1630 LOCAL I%
 1640 FORI%=0 TO13
 1650 IFPNH%(K%,I%+1)=-1 COLOUR128:PR
INTTAB((I% MOD7)*2+2,(I% DIV7)*3+26)C
HR$240+CHR$10+CHR$8+CHR$240:GOTO1680
 1660 COLOUR2:COLOUR129
 1670 PRINTTAB((I% MOD7)*2+2,(I% DIV7
)*3+26)CHR$(240+PNH%(K%,I%+1))+CHR$8+
CHR$10+CHR$(240+PNT%(K%,I%+1))
 1680 NEXT
 1690 ENDPROC
 1700 DEFPROCwrmve(H%,T%,E%)
 1710 COLOUR128:COLOUR2
 1720 PRINTTAB(14,24);H%;",";T%;
 1730 IFE%=0 PRINTTAB(18,24)"U" ELSEP
RINTTAB(18,24)"L"
 1740 PROCd(100)
 1750 ENDPROC
 1760 DEFPROCdname(I%)
 1770 COLOUR128:COLOUR2
 1780 PRINTTAB(0,24)SPC19TAB(0,24)N$(
I%)
 1790 ENDPROC
 1800 DEFPROCwin(I%)
 1810 COLOUR128:COLOUR2:PRINTTAB(14,2
4)"WINS!";
 1820 PROCd(200)
 1830 IFI%=1NA%=NA%+1 ELSENB%=NB%+1
 1840 ENDPROC
 1850 DEFPROCknock
 1860 COLOUR2:COLOUR128
 1870 PRINTTAB(12,24)"KNOCKS"
 1880 PROCd(20)
 1890 SOUND0,-15,6,1:PROCd(18):SOUND0
,-15,6,1
 1900 ENDPROC
 1910 DEFPROCdraw
 1920 COLOUR2:COLOUR128
 1930 PRINTTAB(0,24)"  IT'S A DRAW !!
 "
 1940 PROCd(150)
 1950 ENDPROC
 1960 DEFFNPLAYER
 1970 CLS:PRINTY$"FOR A GAME OF DOMIN
OES,"'Y$"ENTER YOUR NAME"'G$"(less th
an 10 characters please)"
 1980 PRINTY$">>>>>"C$;:INPUT""N$
 1990 PROCd(50):CLS
 2000 IF LEN(N$)>10 GOTO1970
 2010 PRINT''Y$"When the game begins
your name will"'Y$"be displayed with
your dominoes under"'Y$"it."''C$"To p
lay a domino enter the numbers on"'C$
"each end of it and either U or L"'C$
"depending on which end of the chain"
 2020 PRINTC$"you wish to play at."
 2030 PRINT'Y$"For instance if you wa
nted to play a"'Y$"six and a blank at
 the top of the chain"Y$"you would en
ter 6 0 U."
 2040 PRINT'C$"If you can't play you
must Knock by"'C$"pressing K."
 2050 PRINT''TAB(15)G$;:INPUT"RETURN
TO START "IK
 2060 =N$
 2070 DEFPROCstartup
 2080 NA%=0:NB%=0:OVER%=FALSE:NS%=RND
(2)
 2090 C$=CHR$134:G$=CHR$130:Y$=CHR$13
1
 2100 N$(1)="BBC MICRO":N$(2)=FNPLAYE
R
 2110 B$=STRING$(19,CHR$32)
 2120 ENDPROC
 2130 DEFPROCscore
 2140 PRINTC$STRING$(38,"=")
 2150 PRINT''G$TAB(9)"DOMINOES SCORE
TABLE"
 2160 PRINT''C$TAB(9)N$(1)TAB(20)" --
-> ";NA%
 2170 PRINT''Y$TAB(9)N$(2)TAB(20)" --
-> ";NB%
 2180 PRINT'''C$STRING$(38,"=")
 2190 PRINT''G$"DO YOU WANT TO PLAY A
GAIN ";:REPEAT:IK$=GET$:UNTIL IK$="Y"
 OR IK$="N"
 2200 CLS:IFIK$="N"OVER%=TRUE
 2210 ENDPROC
 2220 DEFFNPM
 2230 LOCAL C$,I%,FLP%
 2240 COLOUR2:COLOUR128
 2250 *FX21,0
 2260 PRINTTAB(12,24)">       ";
 2270 C$=GET$:HP%=FNTVAL(C$)
 2280 IFC$="K":=0
 2290 IFHP%=-1GOTO2260
 2300 PRINTTAB(14,24);HP%;",";
 2310 C$=GET$:TP%=FNTVAL(C$)
 2320 IFTP%=-1GOTO2260
 2330 PRINTTAB(16,24);TP%;
 2340 C$=GET$
 2350 IFC$="L"EP%=1 ELSEIFC$="U"EP%=0
 ELSEGOTO2260
 2360 PRINTTAB(18,24);C$
 2370 FLP%=0:FOR I%=1TO14
 2380 IF((((HP%=PNH%(2,I%))AND(TP%=PN
T%(2,I%)))OR((TP%=PNH%(2,I%))AND(HP%=
PNT%(2,I%))))) FLP%=I%
 2390 NEXT:IFFLP%=0GOTO2260
 2400 =FLP%
 2410 DEFFNTVAL(A$):IFASCA$>=ASC"0" A
ND ASCA$<=ASC"6" =VAL(A$) ELSE =-1
 2420 DEFPROCplayp
 2430 LOCAL HP%,TP%,EP%,L%
 2440 PROCdname(2):PROCdisplay(2)
 2450 L%=FNPM
 2460 IFL%=0 KFN%(2)=TRUE:PROCknock:G
OTO2510
 2470 KFN%(2)=FALSE
 2480 IFEP%=1IFNOT((HP%=H%)OR(TP%=H%)
)GOTO2450
 2490 IFEP%=0IFNOT((HP%=T%)OR(TP%=T%)
)GOTO2450
 2500 PROCmpm(HP%,TP%,EP%,L%)
 2510 PROCdisplay(2)
 2520 PROCd(50):COLOUR128
 2530 PRINTTAB(0,26)B$'B$'B$'B$'B$
 2540 ENDPROC
 2550 DEFPROCmpm(HP%,TP%,EP%,L%)
 2560 PROCgoes(HP%,TP%,EP%)
 2570 NOF%(HP%)=NOF%(HP%)-1
 2580 NOF%(TP%)=NOF%(TP%)-1
 2590 PNH%(2,L%)=-1:PNT%(2,L%)=-1
 2600 PNN%(2)=PNN%(2)-1
 2610 IFPNN%(2)=0WFN%(2)=TRUE ELSEWFN
%(2)=FALSE
 2620 ENDPROC
```

This listing is included in this month's cassette tape offer. See order form on Page 174.

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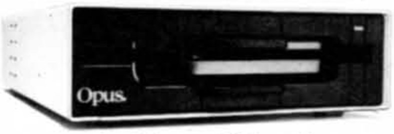

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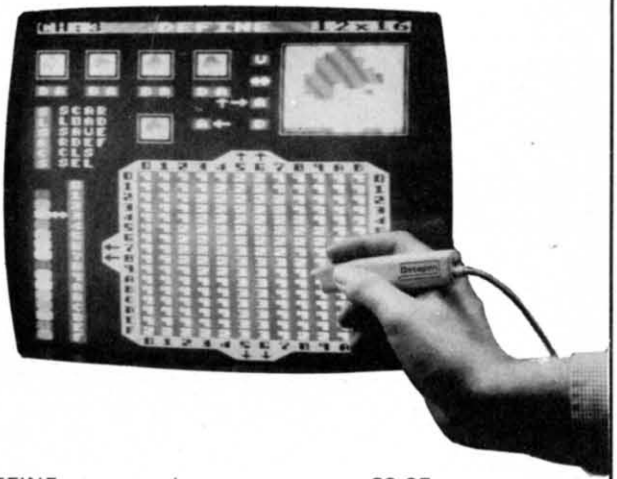

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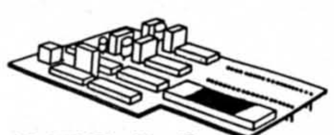

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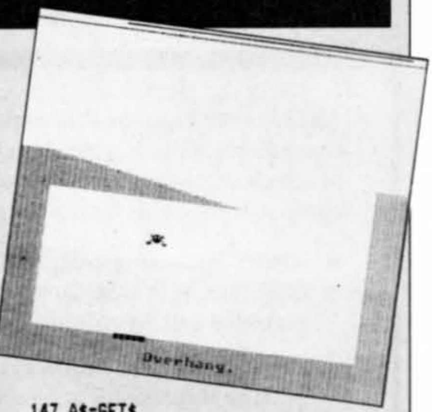
Stellar Rescue listing

From Page 69

```
   61 IF U=1 crashed=TRUE
   62 IF L=2 AND R=2 landed=TRUE
   63 IF (L=2 AND R<>2)OR (R=2 AND L<>
2) landed=FALSE:crashed=TRUE
   64 IF L=3 OR R=3 OR U=3 crashed=FAL
SE
   65 IF X<0 OR X>1279 X=1279-X
   66 IF Y>955 Y=955:YA=0
   67 ENDPROC
   68 DEFPROCdisplay
   69 CLS
   70 A=0
   71 GCOL3,2
   72 REPEAT
   73 MOVE500,600:PRINT"Screen  = ";sc
reen
   74 MOVE500,525:PRINT"Gravity = ";le
vel
   75 MOVE500,450:PRINT"Score   = ";sc
ore
   76 MOVE500,375:PRINT"Lives   = ";li
ves
   77 IF A=0 FORB=1 TO 5000:NEXTB
   78 A=A+1
   79 UNTIL A=2
   80 ENDPROC
   81 DEF PROCdraw(screen)
   82 RESTORE 176:REPEAT:READA:UNTIL A
=screen+2000
   83 GCOL0,1
   84 MOVE40,0:MOVE40,0
   85 READA
   86 FORB=1 TO A:READX,Y:PLOT85,X+40,
Y:NEXTB
   87 GCOL0,2:READX,Y:MOVEX,Y:PRINT B$
   88 MOVE640-((LEN(SC$(screen))/2)*32
),60
   89 GCOL0,2:PRINT SC$(screen)
   90 ENDPROC
   91 DEF PROCvariables
   92 X=100:Y=900:GP=level/2
   93 DX=X:DY=Y
   94 landed=FALSE
   95 crashed=FALSE
   96 FU=50+((8-GP)*135)
   97 XA=0
   98 YA=0
   99 ENDPROC
  100 DEF PROCfuel
  101 GCOL0,0:FORLO=1 TO 25:MOVE40,100
0-LO:DRAW1240,1000-LO:NEXTLO:GCOL0,2:M
OVE40,1000:DRAW1240,1000:DRAW1240,975:
DRAW40,975:DRAW40,1000
  102 FORLO=1 TO FU STEP 4:GCOL0,3:PLO
T69,50+(1150-LO),990:SOUND&11,-15,LO/4
0+50,2:NEXTLO:FU=FU+4
  103 ENDPROC
  104 DEF PROCscore
  105 screen=screen+1:IF screen=16 scr
een=1:lives=lives+1:level=level+1
  106 GCOL0,3:MOVE500,530:PRINT"Score
=":FORLO=FU TO 0 STEP -20:score=score+
10:GCOL3,3:MOVE656,530:PRINT score:GCO
L0,0:NU=50+(1150-LO):MOVENU,990:DRAWNU
-20,990:SOUND&11,-15,255-(50+(LO/20)),
5:GCOL3,3:MOVE656,530:PRINT score:NEXT
LO
  107 GCOL3,3:MOVE656,530:PRINT score
  108 T=TIME:REPEAT UNTIL TIME>T+200
  109 ENDPROC
  110 DEFPROCcrash
  111 A=5:B=6:FORC=1 TO 40:A=B-A:SOUND
0,-15,A,1:VDU19,3,RND(8);0;:NEXTC
  112 lives=lives-1
  113 VDU19,3,7;0;
  114 ENDPROC
  115 DEF PROCinstructions
  116 CLS
  117 RESTORE 130
  118 FORB=1 TO 12
  119 READX,Y,A$
  120 GCOL0,1
  121 FORA=0 TO 16 STEP4
  122 MOVEX-A,Y+A
  123 PRINTA$
  124 NEXTA
  125 GCOL0,2
  126 MOVEX-A,Y+A
  127 PRINTA$
  128 NEXTB
  129 ENDPROC
  130 DATA400,900,"Lunar lander"
  131 DATA400,850,"*************"
  132 DATA100,700,"Try and land your c
raft on the"
  133 DATA100,600,"small pad on the sc
reen, avoiding"
  134 DATA100,500,"the sides."
  135 DATA560,450,"Keys:"
  136 DATA450,375,"Z.....Left"
  137 DATA450,300,"X.....Right"
  138 DATA450,225,"Ret...Thrust"
  139 DATA194,150,"Shift/Space...Pause
/Restart"
  140 DATA274,60,"P E S A Y K Y T   L
Y"
  141 DATA274,50," R S   N   E   O P A
 "
  142 DEF PROCskill
  143 CLS
  144 MOVE400,525:PRINT"Skill level ?(
1-8)"
  145 *FX21,0
  146 *FX11,1
```



```
  147 A$=GET$
  148 A=VAL(GET$)
  149 IFA<1 OR A>8 GOTO 147
  150 level=A
  151 CLS
  152 ENDPROC
  153 DEF PROCtune
  154 GCOL0,2:MOVE500,512:PRINT"Get re
ady!"
  155 RESTORE 163
  156 FORA=1 TO 23
  157 READB,C
  158 IF A=23 SOUND1,0,0,2
  159 SOUND1,1,B,C
  160 SOUND1,0,0,1
  161 NEXTA
  162 ENDPROC
  163 DATA84,10,64,2,84,2,92,2,100,2,8
4,4,84,2,92,4,92,6,104,8,92,6,80,2,84,
10,64,2,84,2,92,2,100,2,84,4,84,2,88,4
,88,6,84,6,132,8
  164 DEF PROCinit
  165 RESTORE174
  166 DIMSC$(15)
  167 FORA=1 TO 15:READSC$(A):NEXTA
  168 VDU23,250,0,0,0,0,&FF,&FF,&FF,&F
F
  169 VDU23,251,19,29,5,15,23,35,240,9
6,23,252,200,184,160,240,232,196,15,6
  170 L$=CHR$(251)+CHR$(252)
  171 B$=CHR$(250)+CHR$(250)+CHR$(250)
  172 ENVELOPE1,1,0,0,0,0,0,0,0,-1,-1,
-1,126,0
  173 ENDPROC
  174 DATA"Paradise.","Overhang.","The
 chimney...","Double overhang.","Devil
's pit.","Round the bend!","Pot-holing
!","Return of the pit.","The tight squ
eeze.","Corkscrew!"
  175 DATA"Nightmare.","My initials!",
"Far country.","The squiggle!","...Mic
ro User!"
  176 DATA2001
  177 DATA13
  178 DATA0,0,0,0,0,500,400,0,400,100,
```

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Stellar Rescue listing

From Page 144

```
800,100,800,0,1200,500,1200,0,1200,100
,0,0,0,0,0,0
  179 DATA585,130
  180 DATA2002
  181 DATA14
  182 DATA0,0,0,600,100,0,100,600,100,
500,700,500,100,500,100,500,100,100,10
0,0,1100,100,1200,0,1100,600,1200,600
  183 DATA400,120
  184 DATA2003
  185 DATA19
  186 DATA0,0,0,500,300,400,0,0,400,40
0,400,0,530,800,500,0,500,0,500,100,70
0,0,700,100,700,0,670,800,800,0,800,40
0,1200,0,900,400,1200,500
  187 DATA590,125
  188 DATA2004
  189 DATA18
  190 DATA0,0,0,600,100,0,100,600,100,
500,700,500,100,500,100,500,100,100,10
0,0,1100,100,1200,0,1100,600,1200,600,
1100,400,1100,400,400,300,1100,300
  191 DATA800,120
  192 DATA2005
  193 DATA25
  194 DATA0,0,1200,0,1100,100,1200,650
,1100,650,1200,0,1200,0,0,0,400,100,12
00,0,1100,100,0,0,0,0,400,100,0,350,40
0,350,0,350,0,350,100,350,0,650,0,600,
850,650,800,600,850,350,800,350
  195 DATA200,380
  196 DATA2006
  197 DATA26
  198 DATA0,0,0,700,100,700,0,0,200,30
0,200,0,300,200,300,0,600,100,600,0,70
0,100,1200,0,1100,300,1200,1000,1100,7
00,900,1000,900,900,300,1000,500,900,3
00,700,400,800,500,350,500,450,800,350
,700,450,800,700
  199 DATA600,480
  200 DATA2007
  201 DATA27
  202 DATA0,0,100,300,0,700,100,500,90
0,800,100,500,100,500,100,300,0,0,900,
200,800,100,0,0,1200,0,800,100,1100,10
0,1200,0,1000,300,1000,300,220,400,100
0,700,1000,300,1200,0,1000,700,1200,70
0,1100,700,1200,800,1100,800
  203 DATA950,130
  204 DATA2008
  205 DATA31
  206 DATA0,0,1200,0,1100,100,1200,750
,1100,800,1200,800,500,800,500,750,120
0,800,1200,750,1200,800,1200,0,1200,0,
0,0,400,100,1200,0,1100,100,0,0,0,0,40
0,100,0,350,400,350,0,350,0,350,100,35
0,0,650,0,600,850,650,800,600,850,350,
800,350
  207 DATA200,380
  208 DATA2009
  209 DATA18
  210 DATA0,0,100,100,1200,0,1100,100,
1200,600,1100,600,650,200,1200,250,120
0,250,1200,0,1200,0,0,0,0,0,100,100,0,
600,100,600,550,200,0,250
  211 DATA150,125
  212 DATA2010
  213 DATA47
  214 DATA0,0,0,800,100,700,0,0,200,20
0,200,0,300,100,600,0,600,100,1000,0,1
000,200,1200,0,1100,300,1200,1000,1150
,800,1000,1000,1000,900,700,1000,700,9
50,200,1000,400,900,300,700,350,600,30
0,400,450,300,400,300,700,300,500,250,
700,300
  215 DATA700,250,900,400,950,350,900,
500,950,500,950,700,1000,750,800,800,8
00,850,600,800,600,850,600,800,550,600
,600,550,600,500,750,550,750,500,800,6
50
  216 DATA650,575
  217 DATA2011
  218 DATA38
  219 DATA0,0,100,100,1200,0,1100,100,
1200,1000,1100,900,300,1000,860,900,30
0,800,400,800,350,500,400,800,400,800,
700,800,860,900,750,600,860,900,860,90
0,1100,900,1100,900,1100,100,1100,100,
0,0,100,100,0,700,100,300,200,600,200,
400,100,300
  220 DATA800,400,900,300,900,600,900,
300,900,300,500,400,700,400,500,600,60
0,650
  221 DATA140,125
  222 DATA2012
  223 DATA42
  224 DATA0,0,0,100,100,0,100,100,500,
600,500,800,500,600,700,800,450,400,55
0,200,450,200,450,300,450,300,400,400,
350,300,400,400,100,100,200,100,100,0,
500,100,700,0,500,100,900,200,900,200,
800,400,700,400,850,600,800,800,1000,7
00,800,800
  225  DATA850,600,700,400,800,400,110
0,200,900,200,500,100,1100,200,700,0,7
00,0,900,100,1200,0,1200,100
  226 DATA240,125
  227 DATA2013
  228 DATA52
  229 DATA0,0,0,100,0,0,200,100,300,0,
200,400,400,0,440,400,500,700,400,0,30
0,200,500,0,580,200,600,0,600,100,900,
0,900,100,1000,0,920,200,1200,0,1000,2
00,1200,800,1000,700,1200,1000,1100,90
0,200,1000,600,900,200,800,400,800,200
,500
  230 DATA300,500,200,500,400,800,200,
800,600,900,600,900,700,900,600,300,65
0,400,700,250,800,250,800,200,800,250,
700,200,700,250,650,400,800,250,800,40
0,900,300,850,400,900,800,800,800
  231 DATA720,430
  232 DATA2014
  233 DATA49
  234 DATA0,0,0,700,0,0,100,200,400,0,
400,200,500,400,700,400,400,600,700,40
0,500,400,500,200,400,200,400,0,500,20
0,1200,0,1100,300,1200,500,1100,500,10
00,550,1200,500,1100,800,1200,1000,110
0,900,800,1000,900,900,800,1000,800,80
0,800,1000
  235 DATA700,850,200,1000,300,850,200
,300,300,500,350,400,300,500,300,500,3
00,700,300,750,700,700,700,750,800,400
,950,450,800,400,800,600,700,750,900,6
00,800,700,1000,800
  236 DATA350,780
  237 DATA2015
  238 DATA64
  239 DATA0,0,0,1000,50,100,50,1000,0,
0,50,100,200,0,50,100,150,100,250,600,
350,600,100,600,100,680,1050,600,1050,
680,350,600,350,600,150,100,150,100,0,
0,50,100,1200,0,1150,100,1150,500,1200
,500,1150,1000,1200,1000,1150,500,1150
,500
  240 DATA1150,100,1200,0,1150,500,120
0,500,1150,450,1150,500,750,450,700,50
0,700,350,720,400,940,350,1000,400,700
,350,700,350,700,500,750,450,600,240,6
00,260,800,200,860,260,800,200,600,240
,460,200,560,240,500,300,660,500,580,5
00,500,300
  241 DATA540,400,440,300,480,400,440,
500,520,500,320,200,400,200
  242 DATA740,290
```

THE
...Micro User!

This listing is included in this month's cassette tape offer. See order form on Page 174.

Don't make a hash of your £s on an Epson printer

ONE perpetual source of annoyance when using Epson printers is their seeming inability to print £ and # at the same time. In addition to this problem, the BBC's code for £ is not the same as the Epson's.

This routine overcomes these problems by intercepting the print vector. The code assumes that you have the printer set to the UK character set.

Type in the listing, save and run it. This will assemble the code and also *SAVE it with the file name £HASH. Now when you want to use the saved code just *RUN £HASH.

The code is assembled to &A60.

When using the routine from Wordwise, do not use the DP embedded command to redefine the pound sign.

The code is disabled by Break. If using it with Wordwise use *W. instead of Break to destroy a complete document.

The print vector at &20E and &20F is used by OSWRCH to point to the actual location of the "print a character" routine in the operating system.

The first part of the listing stores the old contents of these locations and in

By PETER GAUNT

their place puts two bytes to point to some new code.

The new code first checks whether the printer is enabled with VDU2 by checking the contents of &D0. It should be possible to use OSBYTE &75 for this, but doing so causes problems. If the printer is not enabled the routine exits down the old print vecor.

The character to be printed is passed to the OS's print character routine in the accumulator. If the accumulator contains 96 – the BBC's £ code – it is changed to 35 – the Epson's £ code – before exiting down the old vector.

If the character is not £ the program checks to see if it is # code 35 in the Epson's US character set. If it is, it switches the printer to the US character set, prints a # and then switches back to the UK set.

Besides checking for £ and #, the routine also checks for embedded colour and graphics codes – codes greater than 128 – and in their place substitutes a space.

These codes can cause problems on the RX-80 since unless the special graphics code set is selected, they are interpreted as control codes.

If anyone can think of a way of using OSBYTE&75 to read the VDU status instead of reading if from RAM, I'd be grateful to hear – it's aesthetically more pleasing!

```
   10 REM **** £HASH ****
   20 REM (c) The Micro User
   30 REM Enables printing of "#" and
 "£" at same time on Epson printers
   40 REM Assembled code saved after
assembly with file name "£HASH"
   50 oldvec=&20E:newvec=&230
   60 FORI%=0 TO 2 STEP 2
   70 P%=&A60:REM address to allow pr
esence in Wordwise at same time as "S
AFE"
   80 ←OPTI%
   90 .init
  100 LDA oldvec  ½change vectors
  110 STA newvec
  120 LDA oldvec+1
  130 STA newvec+1
  140 LDA#start MOD&100
  150 STA oldvec
  160 LDA#start DIV &100
  170 STA oldvec+1
  180 RTS
  190 .start
  200 PHA
  210 LDA&D0 ½check if printer enable
d with VDU2
  220 AND#1  ½substitute for OSBYTE 1
17 which screws things up.
  230 CMP#1
  240 BNE restore  ½if not enabled re
store A and exit down old print vecto
r
  250 PLA
  260 CMP#ASC"£"
  270 BNE check_hash ½if not pound go
 check for hash
  280 LDA#35   ½else substitute code
35 ("£" in UK char set)
  290 JMP old
  300 .check_hash
  310 CMP#35      ½check for # (ascii
35 and # in Epson's US char set)
  320 BNE colours ½if not # go check
for colour control codes
  330 LDX#0   ½else switch to US char
 set, send hash, switch back tp UK se
t
  340 .switch
  350 LDA codes,X
  360 CMP#&D
  370 BEQ endswitch
  380 JSR old
  390 INX
  400 JMP switch
  410 .endswitch
  420 RTS
  430 .colours
  440 CMP#128   ½check for codes>=128
  450 BCC old
  460 LDA#32  ½if code>=128 substitut
e space
  470 .old
  480 JMP(newvec)
  490 .restore
  500 PLA
  510 JMP old
  520 .codes
  530 →
  540 $P%=CHR$1+CHR$27+CHR$1+CHR$82+C
HR$1+CHR$0+CHR$35+CHR$1+CHR$27+CHR$1+
CHR$82+CHR$1+CHR$3:REM codes to switc
h to US set, send hash, switch back t
o UK set.
  550 P%=P%+1+LEN$P%
  560 NEXT
  570 x$="SAVE £HASH "+STR$÷init+" "+
STR$÷P%
  580 REM Following lines can be repl
aced in BASIC 2 with OSCLI(x$)
  590 DIM B 30:$B=x$:X%=B MOD &100:Y%
=B DIV &100
  600 CALL &FFF7
  610 *ACCESS £HASH L
```

This listing is included in this month's cassette tape offer. See order form on Page 174.

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MICROMAIL

Technique to save precious disc space

RAY Watson in his January 1985 letter to Micromail asked if there was any way he could save small data files to disc using less than the 16k disc space the operating system claims by default.

You replied that you knew of no way to do it. Mr Watson, and other readers, might like to know that it is possible, and is very simple.

The manuals mention that since any file can be used by the random access filing system commands, you can reserve disc space for files longer than 16k simply by using:

```
*SAVE "FILENAME" SSSS +
LLLL
```

to save any block of code of the required length from anywhere in memory (that is any garbage at all), and then writing to and reading from the file using:

```
OPENUP ("FILENAME")
```

and

```
OPENIN ("FILENAME")
```

What they don't say is that you can use the same technique to create files on disc shorter than the default 16k.

```
X=OPENOUT ("NAME") : CLOSE
#X
```

creates a file on the disc, reserving the default 64 sectors, or 16k.

```
*SAVE "NAME" 0000 + 8000
```

creates a file on the disc, 32k long, which can be accessed by OPENUP and OPENIN in the usual way.

```
*SAVE "NAME" 0000 + 00FF
```

creates a file on the disc only 255 bytes long, which can also be accessed in the usual way by OPENUP and OPENIN.

This is a very handy technique for storing small data files, without using up unnecessarily large amounts of disc space. – **Archibald McDonald, Glasgow.**

Italian – plea

THERE are very few BBC Micro users in Italy, and I would like to get in touch with the existing ones.

I have recently bought a Taxan/Kaga KP810 printer (functionally equivalent to the Epson FX80). I have copied the screen dump utility published in the January 1984 issue of The Micro User but it does not work. The paper scrolls but nothing is printed. Help!

In the September 1984 issue (Page 179), I.A. Padgett proposed some poking for speeding up the execution of programs which do not need keyboard input. It doesn't work on my machine, a model B with OS 1.20, Basic I and Watford DFS – **Luca Azzalini, Villaggio Florida 19, 31050 Ponzano V. to, Italy.**

● The printed listing of the screen dump is correct and we feel you must have made an error when typing it in. The pokes you mention do not speed the micro up – they just upset the TIME function.

String getter

RE "Ghosting and getting the method right" in reply to the enquiry by C.P. Rybak, Maidenhead, Berkshire on page 89 of the February Micro User.

The method I adopt for getting input strings interpreted consists of stopping the program, interpreting the string, then resuming (there being no apparent interruption). An extract from my spreadsheet program is given by way of example:

```
  90 ON ERROR ......
 120 INPUTLINE X$
 240 A$=LEFT$(X$,1)
 260 IF A$=":" THEN GOTO 9
80
 980 *FX18
 990 G$="*KEY0 "+"|MGOTO10
10|M":OSCLI G$:*FX138,0,128
1000 END
1010 GOTO 90
```

Of course, this only works with Basic 2. Also the colon-start is included here to prevent accidental erasure by LOAD and SAVE commands, which are intercepted elsewhere in the program. – **Peter A. Bond, London.**

Bad key message

YOUR response to Mr James Robinson's query concerning the Bad Key error message in the February issue of The Micro User *is only partially correct.*

A more common cause is the attempt to program a key so that the total number of characters in the area reserved for function key definitions exceeds the space available, that is more than 256.

*I suspect that this is his problem as I have faced it myself. I overcame it by writing a short program to set up the function keys on start up and making the first line of the program *FX 18, which clears out any existing key definitions left over from games or other programs.* – **J.B. Weller, Kings Lynn, Norfolk.**

● Thanks for your suggestion regarding the Bad Key message – we just explained the most frequent cause of the error.

Details of disc error numbers

IN your reply to John Schofield on page 163 of the February 1985 Micro User you referred to disc error 18. Can you please let me know where I can find details of all the meanings of the various error numbers which occur?

Certainly there is no mention of them in Tony Latham's Disc Companion. – **Wilfred L. Beresford, Stourbridge, West Midlands.**

● Below is a list of disc errors applicable to the 8271 floppy disc controller (single density). A copy of the last disc error can be found by examining location &FE81.

The disc errors usually take the format

Disc error XX at TT/SS

where XX is the error number, TT is the track where the error occurred and SS is the sector where the error occurred.

Error number in hex	Error meaning
08	Clock error
0A	Late DMA
*0C	ID CRC
*0E	Data CRC
*10	Drive not ready
12	Write protect
14	Track 0 not found
16	Write fault
*18	Sector not found

*=most common errors

→

MICROMAIL

Memory gobbled up

I RECENTLY bought an Opus DDOS disc interface and a Cumana 40 track, single sided disc drive. Both function perfectly with my BBC B and I hadn't experienced any problems until recently. Now I find that the memory the disc interface takes up is limiting the size of my programs.

I thought my problems were solved when I saw the Disc Loader program in November's Micro User but unfortunately it seemed only to apply to the official Acorn interface.

Is there any way that this program can be modified for my interface, or is this the price I must pay for not buying official peripherals? – **D. Powell, Doncaster, Yorks.**

● We regret that the article was aimed at the official Acorn DFS and its 8271 FDC. To adapt the program for the variety of DDFSs that exist now could be unpracticable.

Funny spaces

READERS may be interested to know of a "funny" which, though it seems obvious now, caused me a fair amount of head-scratching at the time.

To my knowledge it is not documented anywhere, and it just might be the reason for mysterious misoperation of IF statements.

In the interests of speed and memory conservation, I usually write Basic programs with the minimum of redundant spaces. This generally causes no problems, but recently the statement:

```
IFX%=2E%=R%
```

gave a syntax error.

I eventually realised that the interpreter takes the E of E% as part of an exponent (it's not in the User Guide, but numbers may be expressed in exponent form such as: 2E3 for 2000, 6E4 for 60000 etc).

This will happen with any variable beginning with E, but not, curiously, with keywords such as ELSE or ENDPROC.

On reflection, I was lucky the interpreter could not make sense of the remaining %. In other cases, the effect can be quite subtle.

For example, if the statement:

```
IF Y%=3 EA%=1 ELSE EA%=2
```

were entered without the spaces, it would be interpreted as:

```
IF Y%=3E A%=1 ELSE EA%=2
```

The system happily takes 3E as 3, and no syntax error would be generated. And that could take some finding!

The solution, of course, is a space between the number and the variable. – **Bryan Thresher, Slough, Berks.**

Out of underlines

A FEW months ago I bought a Silver Reed EX44 typewriter with the intention of using it with my BBC B as a printer.

I use the View word processor package and I also bought the Acornsoft printer driver which I hoped would allow me to operate the EX44's underlining.

I have written and phoned Silver Reed, who are very unhelpful.

I am writing to Micromail as my last hope. I do hope you can help me to activate the underlining on this typewriter while using View. – **D.R. Bowman, High Wycombe, Bucks.**

● We are afraid you've caught us out with this one. But our readers have not let us down yet. Over to you, readers . . .

Viglen cartridge

WE would like to point out an incorrect statement in your article on the Viglen ROM cartridge system in the January issue of The Micro User (Page 107).

In this article it is stated that the machine must be switched off before inserting the cartridge. In fact the cartridge has been specifically designed so that it can be inserted and removed without the need to switch the BBC Micro power off.

You must, of course, press Break or Ctrl Break so that the inserted ROM can be recognised by the Micro. – **V. Boyd, Director, Viglen Computer Supplies.**

● We thank Mr Boyd for his comments. It would appear that the reviewer on this point made a technical faux pas.

Lost variables

I AM trying to make a large adventure game on my BBC with discs. I want to put every few locations on disc, so that the Beeb can refer back to them. But it forgets all the variables.

How can I overcome this? I need something like that bit on the Welcome tape where you enter the time in index and it is there on clock. – **Andrew Carter, Blackpool.**

● We're not quite sure what you mean. If you are trying to do what we think you are, you'll be glad to know that the techniques you want are covered in this month's article on overlaying disc files (Page 66).

However don't forget that the resident integer variables retain their values, even when a new program is run.

Pools predictions

I AM writing in reply to two separate letters appearing in the February issue.

The letter "Help me start the dice rolling", requests information on obtaining football pools prediction programs.

I am the author of such a program that has recently been transmitted by the BBC Telesoftware service.

This accesses teletext pages showing current league data to calculate the likelihood of a drawn match.

Unfortunately I am not at liberty to offer you a copy, as the copyright has been sold to the BBC, but they may be able to supply your readers with a copy.

However they are likely to re-transmit this in the future, and would, therefore, be available free to people who own a Teletext Adapter.

The program relies on this add-on to gain access to the Ceefax information during its calculations.

Further in the Micromail section, there is reference to the

Shocks on the line

I LET Mr Cook use my name and that of the Society for the Support of Mornington Crescent on the strict understanding that you were going to publish a computer version of the game.

What you have published is not at all a true reflection of the game. Therefore I am withdrawing my article on the official rules and methods of play. Without Crabbit's diagonal rule the game is reduced to mere skill and cunning instead of the true innovative nature displayed in the best games.

The simple rules of allowing travel on one line only up to four stops has been rendered inaccurate due to the recent tube fare increases. However, the rule preventing players from changing direction on a single line unless the end is reached is novel and will be put to the next committee meeting.

As to Mr Cook's suggestion that players should use a map of the Underground system, let me quote from the Government's Health and Safety at Play Executive:

"Under no circumstances must a map of the London Underground be used due to the risk of electric shocks".

Let us hope that Mr Cook is well insured against any claims that might arise from this. All in all I was a fool to let you use this in the April issue. – **Dr R.T. Fischel, PhD and bar.**

● *Want to write to Micromail? The address is: Micromail, The Micro User, Europa House, 68 Chester Road, Hazel Grove, Stockport SK7 5NY.*

*commands *HON and *HOFF.*

These commands are used when using Telesoft as the filing system, and running Basic or machine code programs.

**HON turns the teletext header line on. This it displays at what it thinks is the top of the screen, the actual position of which is determined by whether the screen has been scrolled or not.*

This screen display, showing the normal header information – time, date, page number currently being transmitted, and service – is constantly updated. This can cause slight delays to the execution time of the program being run.

**HOFF turns off this facility but does not, of course, delete the header line. It simply cancels the updating of the line on-screen.*

When in teletext mode the header is displayed constantly, irrespective of the state of these commands.

Another undocumented feature of the teletext chip is the use of the COPY key. If pressed while in teletext mode – that is looking at teletext pages – it prints the currently displayed page number, including subpage number.

This works even if another page has been requested, but has not yet cycled round – it tells you what is actually on the screen at the time. – **Jeremy Brayshaw, Braintree, Essex.**

Remember the beginners

HAVING recently retired, in December I purchased a BBC B so that learning to use and operate it would give me some mental exercise. I am now working through the Users Guide, some of which I find very straightforward and some of which has me completely mystified.

I have no one to ask, so am working up through the basic principles before tackling the hardest part.

In December I also arranged to receive your magazine each month through my newsagent. Obviously the more advanced articles are, for the moment, quite beyond me, but one item I found most helpful was the article on FOR ... NEXT loops by Mike Bibby.

I notice that this article in December is Part 20 and starts off by saying that all the fundamentals have been covered.

I am quite certain that I would find these previous articles extremely helpful because they are so lucidly explained.

I realise I can get back copies for the previous articles but this would be rather a waste as there is so much in them that I do not yet understand.

Is it possible for the previous parts to be made available – nothing elaborate as you naturally have limited time – but say straightforward photo copies.

One understands that umpteen computers were sold at Christmas of which, no doubt, many would be BBC, and also, no doubt, many would be complete beginners like me.

I feel sure that anyone wanting to learn from scratch, as I am, would not mind paying a reasonable sum to cover the cost of photo-copying, postage etc. – **P.R. Cuthbert, Bexhill-on-Sea, Sussex.**

● Mike's very grateful for the compliments, and as a result of many such enquiries, all these monthly teach-ins have been compiled into a superb paperback, which will save you the expense of all the back issues.

See details on Page 96.

Mouse debugged

I RECENTLY bought the AMX Mouse package through your excellent magazine. After several hours of very enjoyable use a problem began to appear intermittently with the Art program.

After continuous use for 20 to 30 minutes the program crashed. This appeared to happen when one of the pull-down menus was initiated.

I wrote to AMS, who wrote back by return apologising that any queries about the software and possible bugs should be addressed to Elliott Software, Ormskirk, Lancs.

I duly wrote to them more in hope than real expectation of a serious reply. You can imagine my surprise and delight when I received a personal telephone call from Mr Elliott himself one evening apologising for any inconvenience and requesting further details of the problem.

Apparently out of 3,000 sales only two reports of this problem had reached him and he concluded that the fault lay in the machine rather than the software.

He did say that he would keep my letter on file and should a bug materialise he would replace my version.

Within three days he telephoned again – at 9pm on Saturday – to say that a bug had been located and offering a solution.

It is rare to come across such prompt personal service. I hope that you will find room to publish this letter in recognition of an outstanding example of good after-sales service. – **M. Street, Mirfield, West Yorks.**

● Software houses get enough brickbats, so it's nice to be able to publish such a complementary letter.

No dice

IS it possible to make 2 × 8k ROMS programs such as Toolkit 8k and Exmon 8k, into the 16k eprom so I won't have space problems? – **R.G. Payne, Chelmsford, Essex.**

● We're afraid what you are asking is not possible because each individual chip has to occupy the same address and cannot be relocated. In other words they both need &8000 for their start address.

Rum ROM

A COLLEAGUE recently pointed out another bug in the Basic ROM.

He was attempting to identify DATA lines by including a REM on the same line. When a RESTORE statement points to a line number the basic does not appear to test the line to see if it is a DATA line.

I experimented with this, so try this one:

```
   10 RESTORE 30
   20 READ A$,B$
   30 REM RUBBISH,FALSE DAT
A,A LOAD OF
   40 DATA VALID DATA,THIS
IS
   50 PRINT B$;" ";A$
   60 END
```

Note that only DATA following the first comma is read. This is potentially useful. DATA can also be read from PRINT instructions, and probably others. – **Geoff Ayres, Thames TV Computer Club, Teddington, Middlesex.**

● This would appear to be yet another interesting feature of BBC Basic.

Microline

DO you know of a screen dump routine for my Microline 80? For some reason this printer doesn't seem to be very popular with BBC users, even though, for the price, I've always found it quite acceptable.

Secondly, I have been using my Cumana 40 track S/S disc drive for about 18 months without any trouble, but just recently I've been getting the occasional "Disc fault 18" message.

It only happens with the first disc I boot, and the track and sector numbers are not always the same.

For the rest of the session I have no more trouble. Also, it is not restricted to one particular disc.

Is it simply the case that new discs are required or does the problem lie deeper?

I have tried cleaning the drive with a commercially available cleaning disc. I am using the

→

From Page 155

double figures to quadruple figures instantly.

Overall it is a nice game to play with some very interesting features which will hopefully be used on some more Micro Power programs and developed as true arcade/adventures ("Castle Quest" beats "Knight Lore" in this aspect).

However at £14 for the disc version it is very overpriced, but then I suppose all games are. – **M. Mallett, Sandwich, Kent.**

● Your brother deserves congratulating for a quick solution. We old fuddy duddys are still struggling – but perhaps we don't spend enough time on it.

Mouse is in control . . .

I RECENTLY received an AMX mouse, after taking advantage of your special offer, and also at the same time your March edition was published containing another excellent game listing by Graham Walkden, Astro-Mines.

Although I know the AMX mouse is intended for more serious use, I wondered whether it could be used to control the Galaxy Hopper in Astro-Mines, and after only very little experimentation and effort I achieved a result.

Enclosed is a listing which includes only the changed and added lines.

*There may well be more elegant programming techniques for solving the problem, but I've only had the mouse a few days, and the modifications are easy to make. A *FX4,0 is needed before another program is run to restore the editing keys.*

With the added/amended lines, mouse left rotates spacecraft left, mouse right the opposite, Execute button fires a torpedo, Move moves the craft forwards and Cancel restarts the game.

Once you get the idea of programming mouse movements and buttons to be detected from Ascii codes, other combinations are possible, but this seemed to fit the game best. Other games could be changed in a similar fashion.

I am sure that, like me, many readers are taking advantage of your AMX mouse offer, and are impressed by its performance and potential.

We would be pleased to see some listings and articles that make use of its versatility in future editions of your magazine. – **Dr L.R. Staines, Shrewsbury, Shropshire.**

● You will have already seen one useful application of the AMX mouse in the April issue, in the form of a calculator.

We hope to be able to publish other useful applications in the future – but must not forget our readers who are not fortunate enough to possess a mouse.

```
   70 PROCUSR:PROCINIT:PROC
MOUSE:PROCINTRO
  261 IF ASC(A$)=136 THEN R
%=R%-1:IF R%=0 THEN R%=8
  271 IF ASC(A$)=137 THEN R
%=R%+1:IF R%=9 THEN R%=1
  501 IF ASC(A$)=135 THEN P
RINTTAB(X%,Y%);" ":X%=X%+Q%
:Y%=Y%+W%:PRINTTAB(X%,Y%);A
$(R%):SOUND0,4,10,1
 1590 REPEAT:A$=GET$:UNTILA
$="P" OR A$="I" OR A$="t" O
R ASC(A$)=127
 1601 IF ASC(A$)=127 THEN S
TA=1:PROCINIT:A=5:ENDPROC
 1790 DEFPROCMOUSE
 1800 *MOUSE ON
 1810 *BUTTONS 0
 1820 *MC. ON
 1830 *FX 4,1
 1840 *SE.4
 1850 ENDPROC
```

Swedish characters

IT is sometimes necessary in programs to use the Swedish language, which includes six characters not used in English namely Å, Ä, Ö, å, ä, ö, similar to German.

*I have learnt to do this with the user defined keys, using *FX225,240 and VDU23,240-245 as described in the User Guide pages 384 and 439.*

The resultant program has been taped and is loaded into the beginning of programs requiring these foreign letters.

I have had two problems with this:

- *You can't use it in Mode 7, which is very inconvenient.*
- *In the other modes I sometimes get Basic keywords such as PLOT, PRINT etc, instead of my user defined letters.*

Can you please offer some help for these two problems?

Presumably there are also other continental subscribers to The Micro User with requirements similar to mine. Some of the other micros on the Swedish market do offer these facilities built-in.

Perhaps you can help us continentals, who have grown to like the BBC, with a cleaner and faster way of making these foreign letters permanently available on the keyboard.

Being a long way from the centre of action in the UK I have found The Micro User magazine and your monthly taped programs invaluable. Thank you and keep them coming. – **Jack Wheeler, Vallingby, Sweden.**

● To use your program in Mode 7 is, as you say, impossible. The answer to your other problem is that the Basic interpreter is taking your defined characters as tokens and then when you list the program, the tokens are expanded into their true meanings.

The only safe way to obtain the characters is to enclose them in quotes, or VDU or PRINT CHR$ statements.

Docking Elite

HERE are some hints for people who have trouble in docking in Elite.

Find the space station, using your compass, and fly close to it. Then locate the side with the docking bay.

Position yourself so that you are facing the docking bay head on (you should be able to see a rotating square containing a smaller diamond-shape in which you should be able to see the docking bay).

Switch to your rear view and loop, keeping up or down pressed, until the station comes into view.

Accelerate away until the station is about 1 cm square on your screen.

Brake, switch to front view, and loop until you can see the station and get it to the centre of your sights.

Approach quickly, but slow down and stop completely when the station fills your screen.

Making sure the docking bay is centred with your sights, sit back and relax.

It is not necessary to match rotation. Nor is it possible to dock if you have fired on a harmless ship inside the space station's safety zone. – **Brian Horisk, Irvinestown, Co Formanagh.**

Gremlin mouse

I WAS pleased to see my mouse calculator in the April issue of The Micro User. I had a quick glance through the listing, and unfortunately I noticed that a gremlin had crept into line 730. This should read:

IF BUTTON =1 PROCkey ELSE 830

I don't know how the error crept in and hope this is of some help to the readers. – **Geoff Turner, Bury, Lancs.**

● Thanks for the information, Geoff. This one has us puzzled as well as you. It is a complete mystery how line 730 appeared wrongly in the magazine.

format.

We have patched our copy of the program to enable input of the search string in a normal, logical way. Perhaps your readers may be interested. The patch is as follows:

```
  500 .eost STAs_buffer,Y:S
TYlength:LDX #0:TYA:CLC:ROR
A:STAmean:LDY length:DEY
  502 .rev_loop LDAs_buffer
,X:STAtemp
  504 LDAs_buffer,Y:STAs_bu
ffer,X:LDAtemp:STAs_buffer,
Y
  506 INX:DEY:CPX mean:BNEr
ev_loop
  508 JSRosnewl:JMPosnewl
```

Two additional variables have been used, mean and temp. These have been inserted at lines 70 and 80 as follows:

```
   70 number=&2A:limit=&2B:
track=&2C:sector=&2D:mean=&
2E
   80 string=&70:pointer=&7
2:length=&74:temp=&76:buffe
r=&7100
```

– **R.K. Halpin, Halworth Software Services.**

● We are grateful for your compliments, and of course for the enhancements to an excellent utility.

On the Welsh menu

I AM a 14 year old student and one of my subjects is computer studies.

At present I am in the process of working on my computer project, which is a Welsh language program.

The menu is on the attached sheet. I am having a problem with number 4, deleting a file from the disc within the program.

Also I would like to know how to make the program automatically press Break.

I would like to use this facility for number 8, exit from program.

MENU

1. *Create and save lesson.*
2. *Add to lesson.*
3. *Run lesson.*
4. *Delete lesson.*
5. *Change entry.*
6. *Delete entry.*
7. *Search for a word.*
8. *Exit from program.*

An entry is a word within a lesson. I own a BBC Model B. – **N. Langford, Mountain Ash, Mid Glamorgan.**

● Unfortunately you don't tell us what problems you are having with item 4.

As far as we are concerned the correct method is to include in your main program:

```
*DELETE "filename"
```

If this doesn't work you are doing something wrong. The answer to your Exit option is to:

```
CALL !-4
```

Challenge met

NO doubt you have heard of the challenge issued by Micro Power for their new program Castle Quest for the BBC, "Bet you £1 you can't crack it".

Well, suffice it to say that the three month time limit allowed is much longer than needed, since my brother has just finished it in five days, with a little help from myself.

I thought you might be interested in a few comments about the game. Firstly, the "MP4 Scrollerama" is quite good but not a brilliant innovation.

The playing area is disappointingly small, I find it hard to believe that it couldn't have been made bigger.

However the puzzles involved in solving the game are very good. In my opinion they are the best part of the game – more worth having than the special scrolling.

The biggest disappointment is when one has finished the game, or more correctly, found the treasure, because that is it – nothing else happens.

There is no second screen with new puzzles, no starting again with more and fiercer meanies, just an end game message with a score that has increased from

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MU5

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UDM version 2.0 DDFS. – **C. Ward, Accrington, Lancashire.**

● We have recently had plenty of help for readers with Juki and Shinwa problems. Are there any Microline users who can help Mr Ward?

The way your drives are playing you up has us completely stumped.

On error listing

THE following program enables you to list a program within a program:

```
   10 ON ERROR REPORT:PRINT
 "at line ";ERL:VDU 7:A=GET
:CALL &A00:END
```

This allows program to list on an error. Before the above line can be Run, the following program must be executed:

```
   10 P%=&A00
   20 [OPT 0
   30 LDA#138:LDX #0:LDY #7
6:JSR &FFF4
   40 LDA#138:LDX #0:LDY #4
6:JSR &FFF4
   50 LDA#138:LDX #0:LDY #1
3:JSR &FFF4
   60 RTS
   70 ]
```

– **N. Fedorowycz, Wakefield.**

Translating floating point variables

I THOUGHT your readers might be interested in this information in connection with floating point variables and how they can be translated from decimal to internal format and vice versa.

Several magazine articles and books have described how the BBC, and other computers, stores its real floating point variables in 5 bytes.

In particular refer to The Micro User, September 1983, and Ian Birnbaum's excellent book on Assembly Language Programming.

However it may still be a mystery as to how &8B25FB851F could possibly be the number 1327.86.

By careful long winded bit manipulation it is possible to translate the 5 byte number to decimal and vice versa, but there is a far easier way to accomplish this by using the BBC to do the hard work without direct access to the internal Basic routines.

The listing shown illustrates a method which makes use of the variable map at &400 and the seldom used variable name _, the underline character (in addition to all upper and lower case letters variable names may also contain the £ character).

The only requirement for the listing to work is that no other variables should start with the character _ followed by the same or other characters.

Locations &4BE, &4BF in the variables map contain the address where the first variable beginning with _ is located. This would be in the area above LOMEM, of course.

Provided no more variables beginning with _ are used the address+3 to address+7 will contain the 5 bytes forming the stored number allocated to the variable _ in the form exponent (power of 2), followed by a 4 byte number with the MSB first and ending with the LSB.

These listing will work with any Basic (1, 2 or HiBasic) as well as in the 6502 second processor.

Try a few difficult decimal numbers and see the form in which they are actually stored in the BBC and translate them back to decimal numbers again.

Inaccuracies in the last figure for some numbers can be expected. – **R. Immelman, Somerset West, South Africa.**

```
   10 CLS
   20 REPEAT INPUT "Read, w
rite, end (R,W,E)",rw$:UNTI
LINSTR("rwRWEe",rw$)
   30IF rw$="R" OR rw$="r"
GOTO 180 ELSE IF rw$="E" OR
 rw$="e" END
   40 REM VARIABLE WRITER
   50 REPEAT
   60 INPUT "Enter decimal
variable ",K
   70 PROCwrite(K)
   80 UNTIL0
   90 END
  100 DEFPROCwrite(k)
  110 _=k
  120 addrz=?&4BE+?&4BF*256
  130 k1=addrz?3:k2=addrz?4
:k3=addrz?5:k4=addrz?6:k5=a
ddrz?7
  140 PRINT"&";~k1;SPC1;~k2
;SPC1;~k3;SPC1;~k4;SPC1;~k5
  150 ENDPROC
  160 REM
  170 REM
  180 REM VARIABLE READER
  190 REPEAT
  200 INPUT"Enter 5 Hex byt
es (eg 4A) "',K1$,K2$,K3$,K
4$,K5$
  210 K1=EVAL("&" +K1$):K2=
EVAL("&" +K2$):K3=EVAL("&"
+K3$):K4=EVAL("&" +K4$):K5=
EVAL("&" +K5$)
  220 PRINT FNvar(K1,K2,K3,
K4,K5)
  230 UNTIL0
  240 END
  250 DEF FNvar(k1,k2,k3,k4
,k5)
  260 _=0
  270 addrz=?&4BE+?&4BF*256
  280 addrz?3=k1
  290 addrz?4=k2
  300 addrz?5=k3
  310 addrz?6=k4
  320 addrz?7=k5
  330 =_
```

Data file problems

HAVING completed two years of a degree which involved a lot of work using computers, I decided to take a year off, relax, and buy a micro.

My original intention had been to buy a QL, but after listening to a few opinions, and reading the October issue of your fine publication, I had changed my mind.

In early November, I bought a BBC Micro with Acorn 1.2 DNFS fitted.

It is an excellent machine, and has been useful for programming purposes, as well as playing the odd game! I would, however, like to make a few points:

● *I am aware that a downloader routine disables the DFS. Is there any way to store the high-scores for any of your games, notably Pyramid Painter – on a disc data file? Failing that, can I still use an already implemented tape data file?*

● *Is there any way to find the end of a disc data file, other than READ # ing UNTIL EOF?*

Finally thank you for a well-written, interesting, and professional magazine – one of the best I have seen. – **Stephen Murgan, Leytonstone, London.**

● Once the DFS is disabled there is no way you can use it to save data in this way.

You can however implement your tape data file as if you had loaded the program from cassette.

EXT will give you the size of a disc data file. More details in a forthcoming article.

Search string patch

THE disc read facility presented by Shingo Seguira in the March issue of The Micro User is a useful and elegant program.

Nevertheless in using it we found that a data search needed the search string to be entered in reverse order, a consequence of the BBC computer data file

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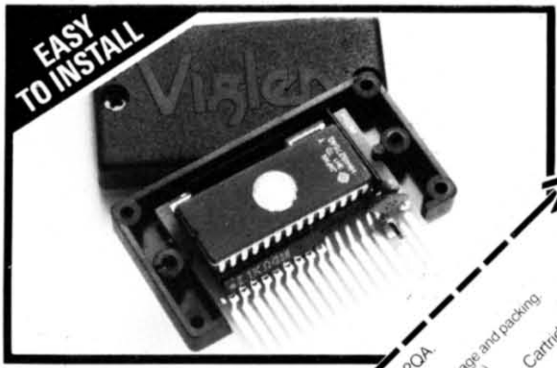

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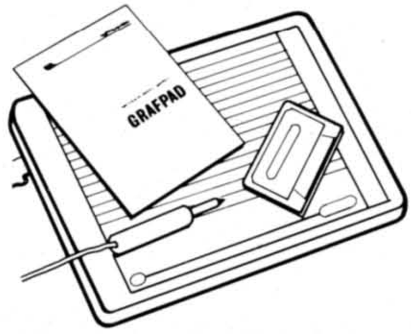

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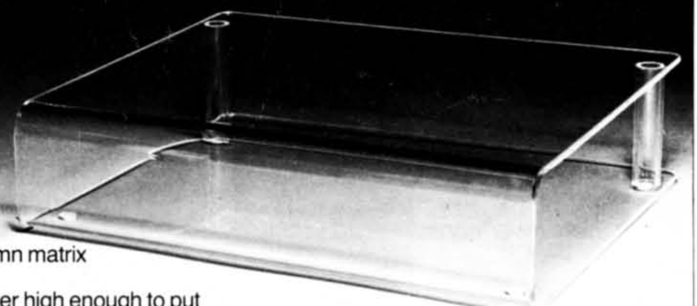

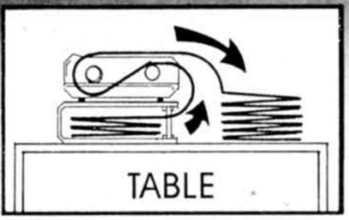

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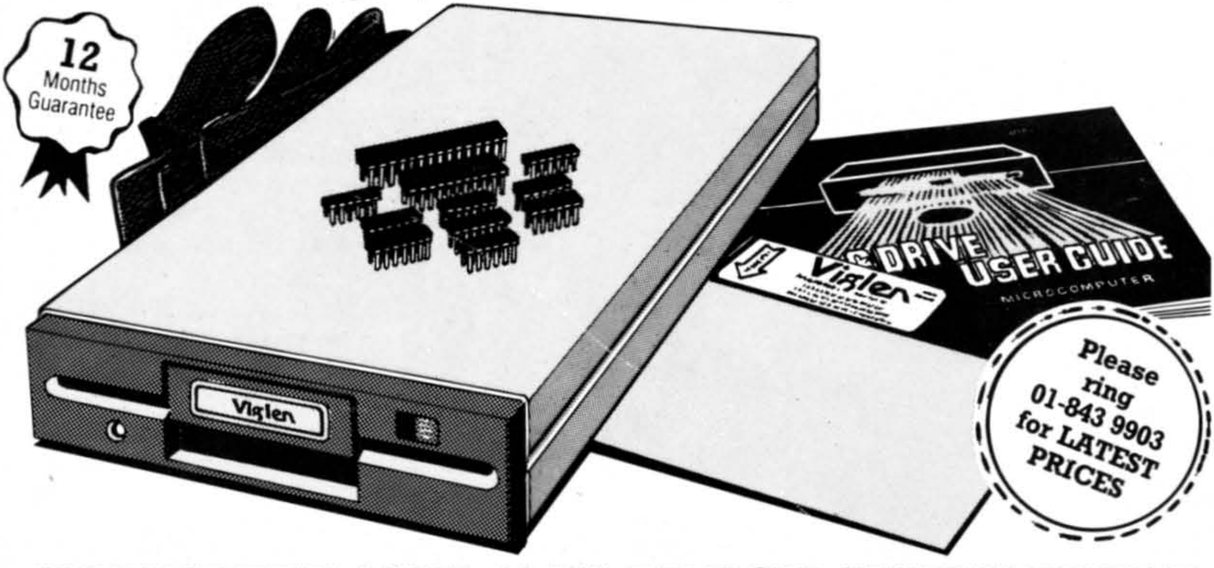
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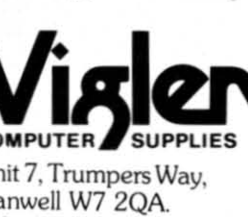
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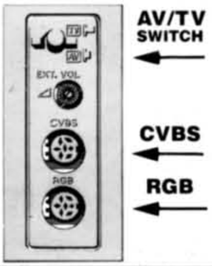

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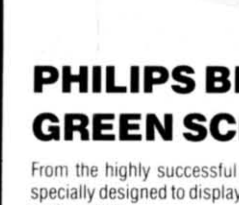

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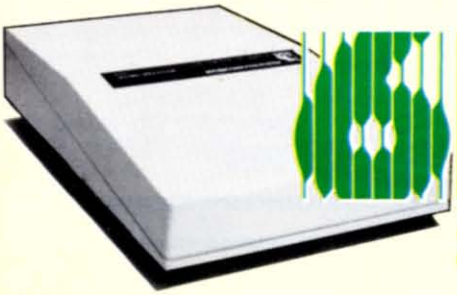

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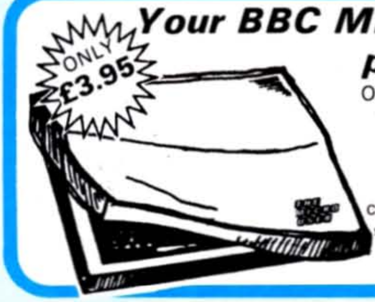

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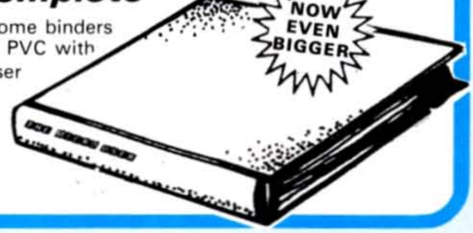

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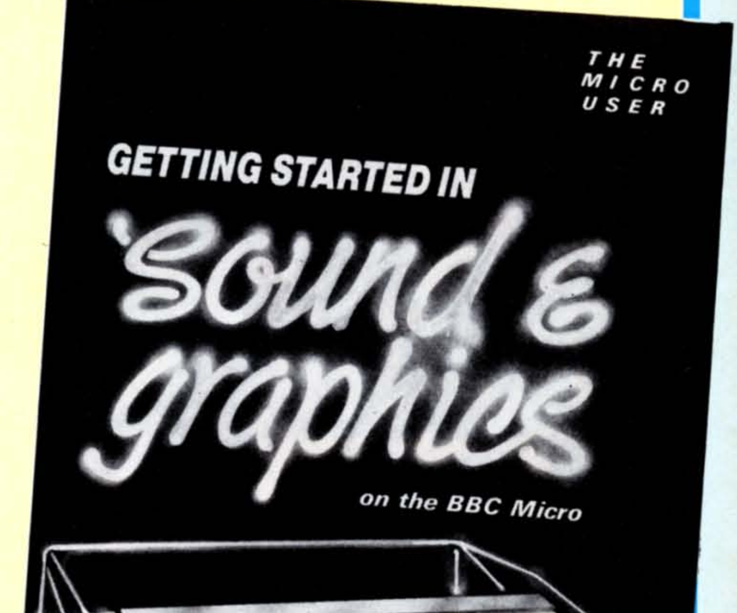

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MAY: Dug Dig, asteroid adventures. **Damraider,** naval action. **Envaid,** easy envelopes. **Steppers,** Body Building motor control. **Spiro,** graphics windows. **Adventure,** a trapdoor maze. **Renumber,** program utility. **Bigletter,** large type. **Memory,** RAM efficiency.

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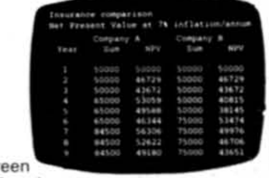

```
Insurance comparison
Net Present Value at 7% inflation/annum
          Company A          Company B
Year     Sum      NPV       Sum      NPV

  1     50000    50000     50000    50000
  2     50000    46729     50000    46729
  3     50000    43672     50000    43672
  4     65000    53059     50000    40815
  5     65000    49588     50000    38145
  6     65000    46344     75000    53474
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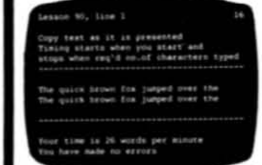

```
Lesson 90, line 1                       16

Copy text as it is presented
Timing starts when you start and
stops when req'd no.of characters typed
----------------------------------------

The quick brown fox jumped over the
The quick brown fox jumped over the

----------------------------------------

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```

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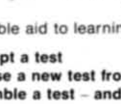

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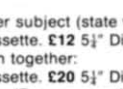

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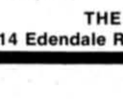

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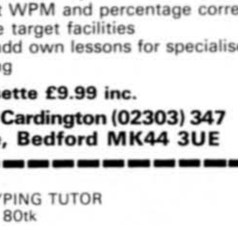

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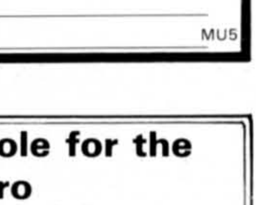

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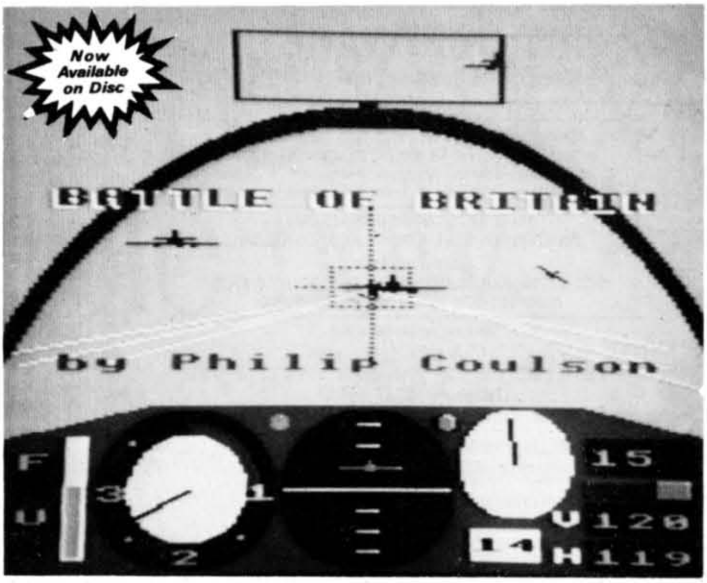

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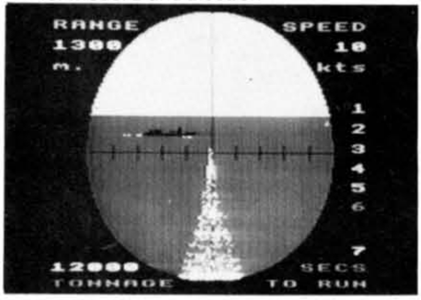

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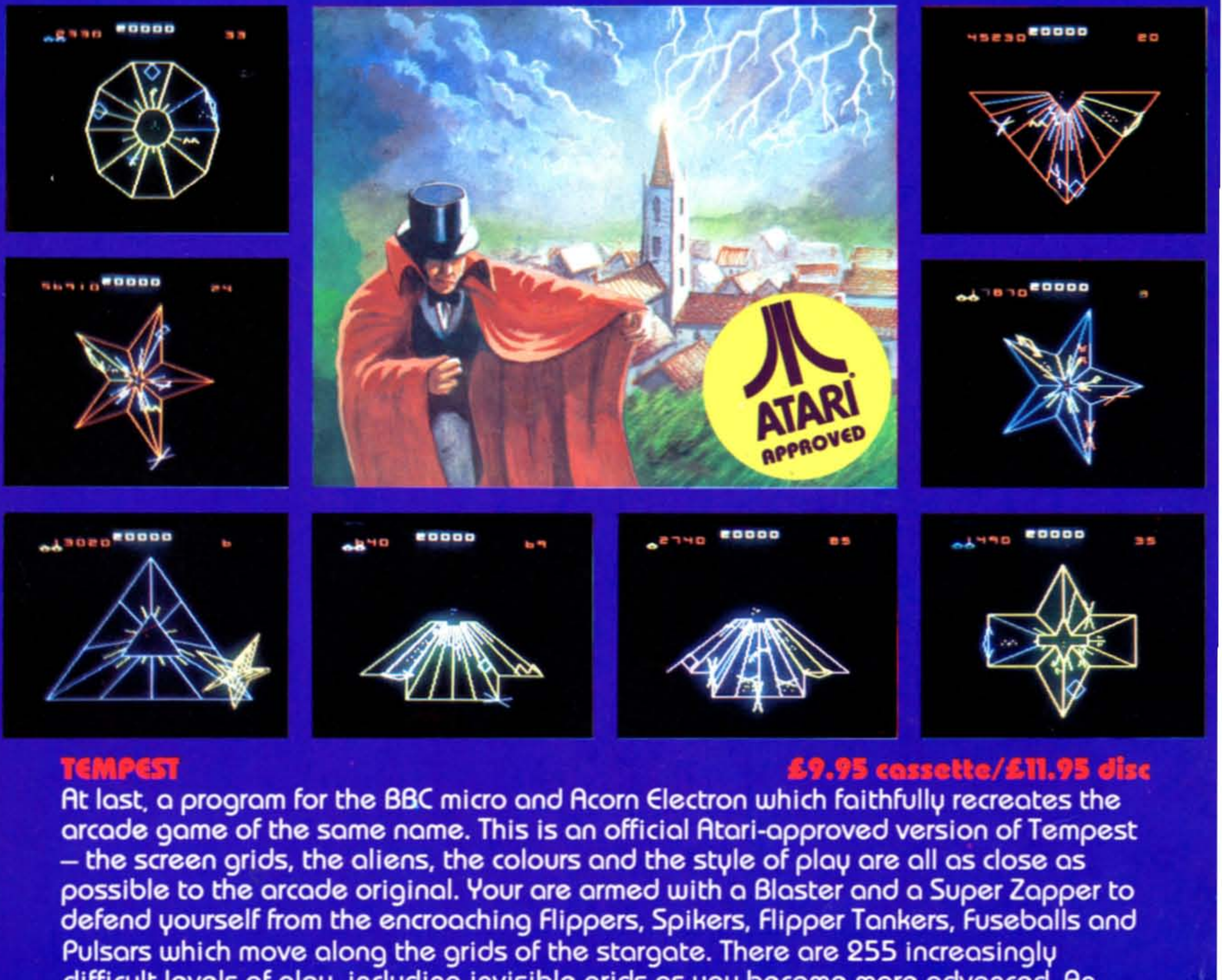
BBC MICRO

◆ AN ARCADE-GAME EXPERIENCE ◆



TEMPEST

£9.95 cassette/£11.95 disc

At last, a program for the BBC micro and Acorn Electron which faithfully recreates the arcade game of the same name. This is an official Atari-approved version of Tempest – the screen grids, the aliens, the colours and the style of play are all as close as possible to the arcade original. Your are armed with a Blaster and a Super Zapper to defend yourself from the encroaching Flippers, Spikers, Flipper Tankers, Fuseballs and Pulsars which move along the grids of the stargate. There are 255 increasingly difficult levels of play, including invisible grids as you become more advanced. An excellent game, destined to become a 1985 top-seller, Tempest is available for the Acorn Electron on cassette, and for the BBC micro on cassette or disc.

OTHER TITLES AVAILABLE: £7.95 EACH ON CASSETTE

OVERDRIVE (BBC/ELECTRON)
SMASH AND GRAB (BBC/ELECTRON)
MR. WIZ (BBC/ELECTRON/C64)
SPACE PILOT (BBC)
BMX ON THE MOON (BBC)
STAR STRIKER (BBC)
JACK AND THE BEANSTALK (BBC)
COSMIC KIDNAP (BBC)
ALIEN DROPOUT (BBC/ELECTRON)
STRANDED (BBC/ELECTRON)
BATTLETANK (BBC)
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SPITFIRE COMMAND (BBC)
WORLD GEOGRAPHY (ELECTRON/ 64)
ROAD RACER (BBC)

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(1) All our software is available before we advertise.
(2) All our software is despatched within 48 hours by first-class post.
(3) In the unlikely event that any of our software fails to load, return your cassette to us and we will immediately send a replacement.

THE SCREEN PICTURES SHOW THE BBC COMPUTER VERSION OF TEMPEST

Drives Apart–High Capacity Low Cost Disk Drives for QL and BBC Micro's

With so many disk drives on offer, choosing can be a somewhat confusing and difficult exercise. On the surface they all seem to perform and look the same. Of course that's not the case and what it all boils down to at the end of the day is the data storage reliability and the number of bytes of disk storage you get for every £ spent.

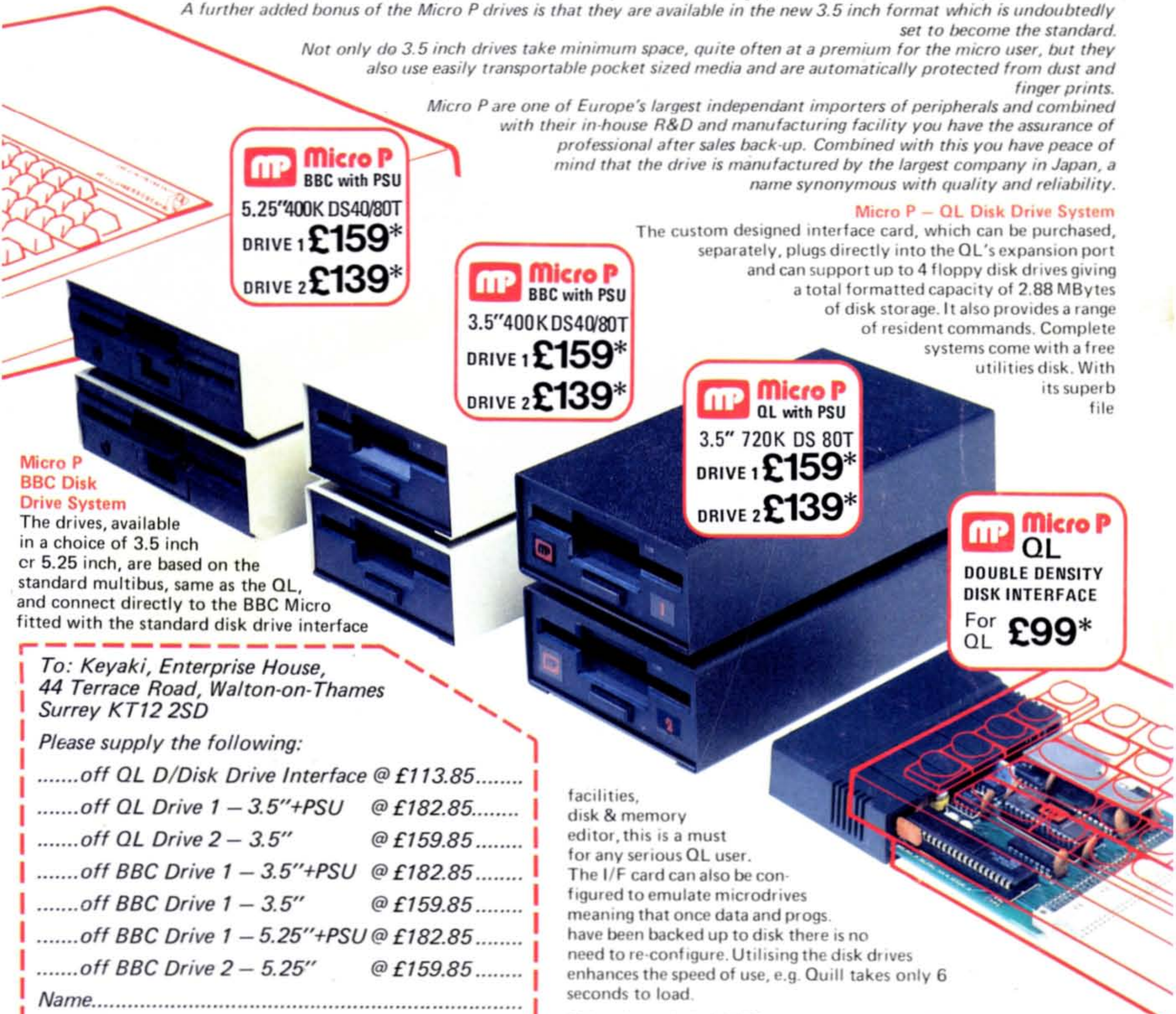
Take the new range of professional 3.5 inch and 5.25 inch disk drive systems from Micro P. They are designed for use with QL and BBC Micros, housed in a rugged metal case, essential for screening from stray electrical fields which can reduce data storage reliability, and have their own power supply so as not to drain precious power from your micro needed for other less sufficient peripherals.

Most important of all you get in excess of 452 bytes of disk storage per £ for the QL and 251 bytes for the BBC.

A further added bonus of the Micro P drives is that they are available in the new 3.5 inch format which is undoubtedly set to become the standard.

Not only do 3.5 inch drives take minimum space, quite often at a premium for the micro user, but they also use easily transportable pocket sized media and are automatically protected from dust and finger prints.

Micro P are one of Europe's largest independant importers of peripherals and combined with their in-house R&D and manufacturing facility you have the assurance of professional after sales back-up. Combined with this you have peace of mind that the drive is manufactured by the largest company in Japan, a name synonymous with quality and reliability.



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Micro P
QL
DOUBLE DENSITY DISK INTERFACE
For QL £99*

Micro P – QL Disk Drive System

The custom designed interface card, which can be purchased, separately, plugs directly into the QL's expansion port and can support up to 4 floppy disk drives giving a total formatted capacity of 2.88 MBytes of disk storage. It also provides a range of resident commands. Complete systems come with a free utilities disk. With its superb file facilities, disk & memory editor, this is a must for any serious QL user. The I/F card can also be configured to emulate microdrives meaning that once data and progs. have been backed up to disk there is no need to re-configure. Utilising the disk drives enhances the speed of use, e.g. Quill takes only 6 seconds to load.

Micro P BBC Disk Drive System

The drives, available in a choice of 3.5 inch or 5.25 inch, are based on the standard multibus, same as the QL, and connect directly to the BBC Micro fitted with the standard disk drive interface

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